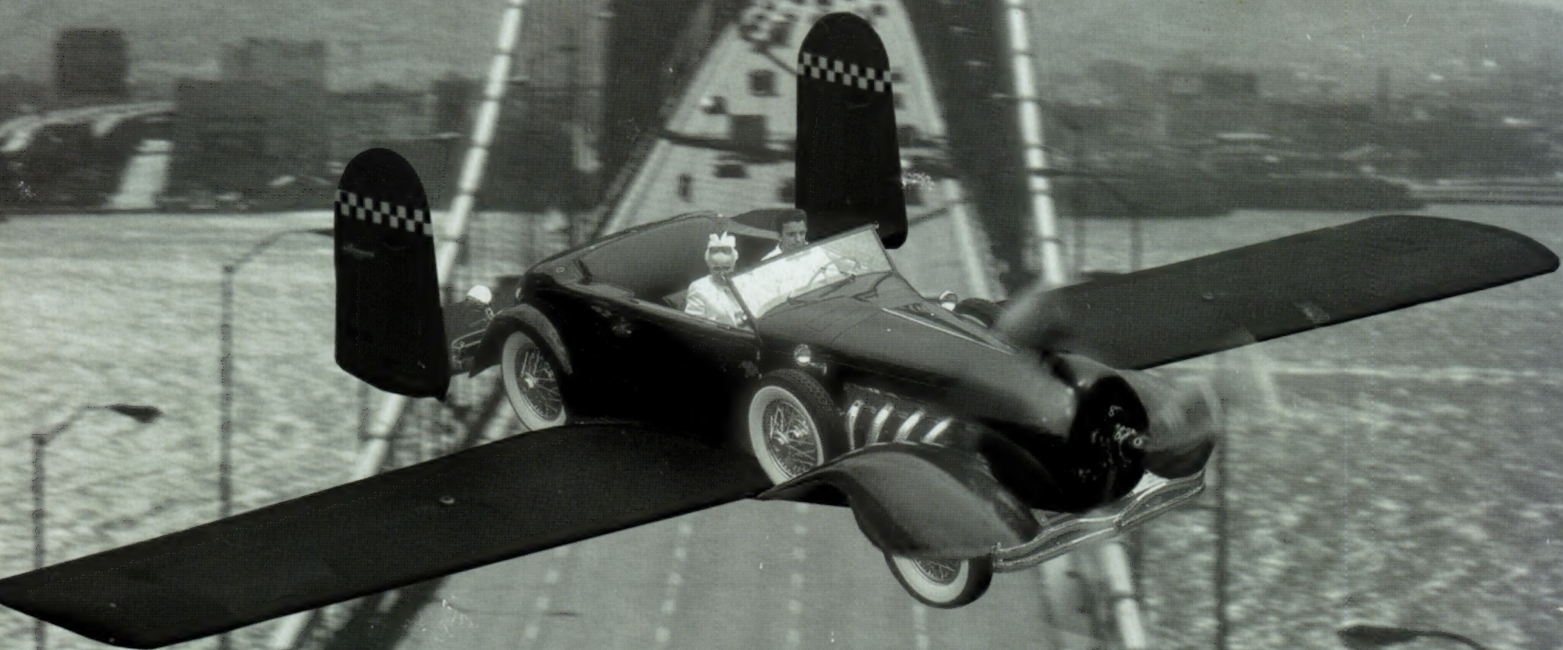


Flight Simulator^{WORLD}

April/May 2001
Vol. 8 No. 2
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Getting Real Part 3
A Pacific Crossing
Flying With Satco
Round Robin
Golden Gate fly-through



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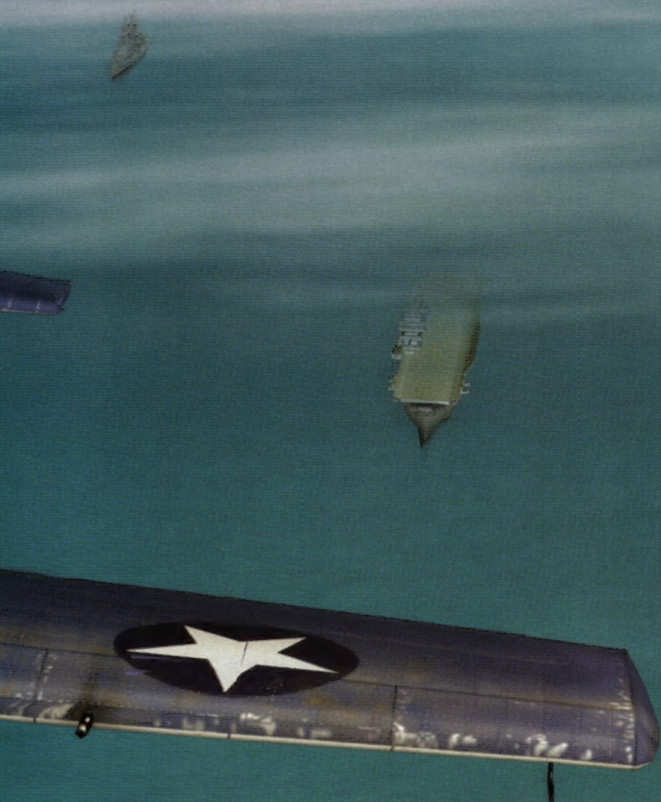
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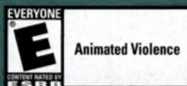
DETERMINED THE COURSE OF WORLD WAR II.



THE COURSE OF MIDWAY.



WWW.MICROSOFT.COM/GAMES/COMBATFS2



Zone.com

Microsoft

Volume 8 Number 2 April - May 2001

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From The Editor

Tim Dickens, Managing Editor



Now that spring is upon us, the annual cycle of renewal is bringing the leaves back to those barren trees again. But what is even more exciting for flight simulation enthusiasts is the semi-annual cycle of renewal to which we've become accustomed. That is, the new crop of general aviation simulators that comes to market regularly every two years.

Both Microsoft and Terminal Reality are scheduled to release the latest editions of their flight simulation programs. Fly! 2, from TRI, is scheduled for release this spring, and Flight Simulator 2002 will be hitting the shelves around October. Both promise to bring more new features, realism and eye candy to the table.

But of course, some of the technical aspects of the programs will obviously have changed since their last versions. So, it will take a while for the third party developers to catch up with the technology, and start producing more of those great add-ons to which we've become accustomed. And make no mistake about it, it is the third party aspect of flight simulation that makes it a complete hobby. There is a lot of "entertainment software" on the market, and there always will be. What sets flight simulation apart from the others is the continual involvement with new aspects of the hobby. Those new aspects being the fantastic add-ons, that both improve the scope of the original product and give the end user some *value added*. A reason to keep coming back to it.

Developers, both freeware and commercial, can direct their energies toward producing something of *value*. The process of creation itself can be perceived as a *value*, the same as an artist holds a finished work of art, or as an engineer or architect can stand back and look at the building they just constructed and say, "hey, I made that"! Flight simmers can add these creations to their systems, and receive additional *value* from the work those people have produced. Either way, it keeps people coming back to the simulator, instead of just going out and finding something else to occupy their time. In other words, it makes flight simulation a *complete hobby*, and not simply another entertainment title. The add-ons insure that an individual simulator will not get stale.

It is my belief that the developers of the current simulators hold this basic concept to be true. Alternatively, perhaps it would be more appropriate to say that they *had better* appreciate this aspect of the hobby. The industry is replete with examples of simulator developers who did not believe in this, and have paid the price. Flight simmers that have been around a while will recognize the names *Pro Pilot* and *Flight Unlimited*. Both of those simulators were developed by companies that did not embrace this "complete hobby" philosophy, and produced products that were "closed systems", leaving no room for 3rd party developers to create new material for them. They left no room for anyone else's creations, and gave no reason for people to keep coming back to their program. Both simulators were complete failures in the market, and I believe it is because there simply was no *value added*. It was certainly *not*, because there are not enough flight simulation enthusiasts out there.

I am emphasizing this because this is critical for the future of any flight simulation product. In addition, it is my hope that this is not taken for granted. It's disheartening to see that as I write this today, it has been over five months since *Combat Flight Simulator 2* hit the shelves, and the third party market is *still* completely in the dark with respect to the internal aspects of the scenery and aircraft used in the program. I am not one of those testy flight sim enthusiasts that are always griping on the Internet forums about the software developers, who think that they *owe* us this technical information. They don't *owe* us anything. They owe it to themselves, to keep their simulation product a complete hobby, not another entertainment title. I hope they take this to heart, so that the developers can get to work as soon as possible and start producing those fantastic add-ons.

Keep The Blue On Top

Pilot's Note: This information is not intended for use in actual flying situations. While the information is as realistic as possible, you should not use it for actual flying instruction. *Safe flying!*

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Pacific Crossing



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Flying The Golden Gate



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Getting Real



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Flying With SATCO

This is our latest installment on Flying With SATCO (Simulated Air Traffic Controllers Organization). SATCO is the umbrella organization for thousands of flight simulator users who fly online with simulated ATC.

One of the neatest activities for online flying is participating in *fly-ins*. In this issue, we'll look at some recent examples of online fly-ins.

20

Pacific Crossing

Read about Al's "once in a lifetime opportunity" last October of accompanying an Air Canada crew for a full cycle on a trip from Vancouver to Seoul, Korea.

27

Flying The Golden Gate

The Bay Area is one of Doug Horton's favorite places to visit. He decided that an air tour of the Bay Area would be a high priority after getting his certificate. Although this is a real-life experience, we could subtitle this article "A beginner's guide to understanding San Francisco airspace."

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Getting Real

Doug Horton has written about his experiences obtaining a real Private Pilot certificate in the last two issues. He describes his last month of training and the flight exam in this issue along with his impressions of how his personal computer flight simulation experience related to his experiences in real airspace.

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Roadable Aircraft, VTOL & Flying Cars

Will a hybrid automobile/airplane be in your garage in the near future? Perhaps so!

45

Commuter Flight in Montana

In this Round Robin adventure, we're on a routine daily commute flying for a regional airline between four cities in Montana ("Big Sky Country").

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Scenery Design Corner

Creating photorealistic scenery for FS 2000

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Optimizing Windows for FS 2000

Tips and information on how you can make your PS 2000 experience more enjoyable in Windows.

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The cover artwork for this last issue of the year was created by Matt Ridgway.

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NOTAMS: New Products

Flight Simulator 2002

From Microsoft

Microsoft has announced that production has begun on the next edition of its highly successful Flight Simulator series; Flight Simulator 2002. Scheduled for release in the fall of 2001, the latest version of the simulator will feature many new innovations:

- ➔ Interactive Air Traffic Control (ATC) via pop-up menus and key commands. Virtual pilots will ask for permission to taxi, take off and land, plus request en route clearances and vectors for instrument approaches. ATC will respond with verbal instructions.
- ➔ Auto-generated scenery - when flying above cities, towns, farmland, and landscapes, the simulator will automatically add buildings and vegetation appropriate to the terrain below and blend them into the horizon.
- ➔ A new artificial intelligence system generates air traffic around and between airports.
- ➔ New aircraft models and special effects, including more complex visual details and subtle shading and lighting effects. Many of the special effects from Combat Flight Simulator 2 will be incorporated into Flight Simulator 2000, with the addition of contrails from high-altitude jets, dramatic lighting effects, and puffs of smoke from tires at touchdown.
- ➔ New aircraft will include the Boeing 747-400 jumbo jet, Beech Baron, and Cessna Caravan on amphibious floats.
- ➔ Enhanced virtual 3-D cockpits with working instruments.



For those of you who aren't familiar with the term, NOTAMS is an acronym for NOTices to AirMen. The U.S. Government issues NOTAMS regularly. This issue of *Flight Simulator World* includes our version of NOTAMS — an expanded new products section. It's a regular part of our magazine. The products listed are compiled from press releases and information provided by the respective authors and companies who supply the products. We've taken steps to verify the information with each author or company, but cannot be responsible for inaccurate features, specification or availability dates.



- Flight analysis with maps and graphs showing course, altitude and speed
- Professional Edition will include a multiplayer "instructor's station."
- New lessons and challenging flights, with new and expanded lessons and flights to help new users of Flight Simulator.
- Tools for add-on developers, including gMax, a 3-D modeling tool from Discreet. Scenery developers will be able to create objects using an industry-standard format. Also, a vastly improved Flight Dynamics Editor that makes modifying and creating "Flight Simulator" aircraft much easier.

For More Information

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
www.microsoft.com/games/fs2000/fs2002.asp

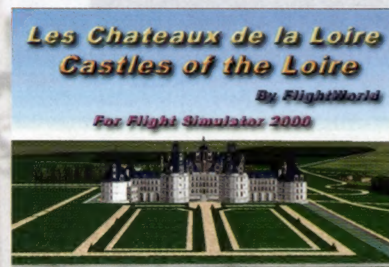
Polynesia 2000 Castles of the Loire

From SimWare Simulations

These two scenery packages for Microsoft Flight Simulator 2000 feature realistic road and railway substructures, based on the maps of the National Geographic Institute, dynamic scenery, and custom texturing.

Polynesia 2000 features the remote islands Bora Bora, Moorea, Maïao, Mururoa, Tetiaroa.

Castles of the Loire features scenery in a radius of 130 km around Tours, with 14 aerodromes and 11 custom-made 3-D castles.



For More Information

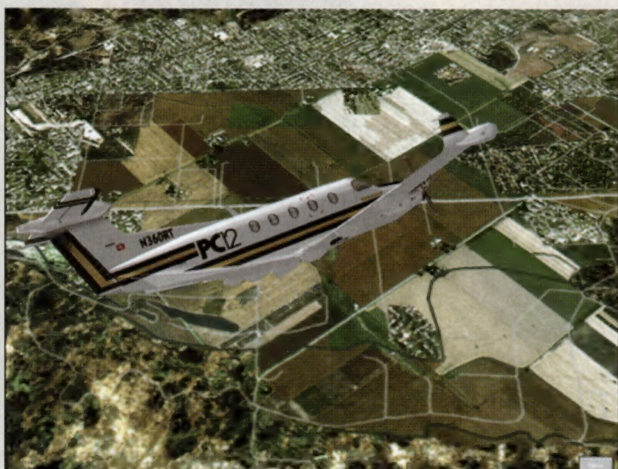
SimWare Solutions
<http://www.simw.com/>
SRP 1,250 Belgium Francs each (about \$28.75 U.S. each)

NOTAMS: New Products

FLY! II

From Terminal Reality

The sequel to the general aviation simulator FLY!. is scheduled for release in April 2001 (at press time). This new version of the simulator will be powered by the Photex3 graphics engine, and will include pre-configured single user adventures, downloadable community adventures, and extended multiplayer flight parties.



New features will also include:

- ➔ **New aircraft**, including the Pilatus PC-12 Turboprop and Bell 407 helicopter.
- ➔ **Updated versions of aircraft included in FLY!.** including the Cessna Skyhawk single-engine prop, Beechcraft KingAir twin-engine turboprop and Raytheon Hawker business jet
- ➔ **New scenery imagery.** FLY! II expands FLY!'s existing flight scenery using the Terrascene 2 scenery system by Perspective
- ➔ **Downloadable community adventures and challenges.**
- ➔ **Extended multiplayer flight parties.**
- ➔ **Dynamic vehicles**, including airport vehicles such as fuel trucks, emergency vehicles, and baggage handlers.
- ➔ **Compression technologies.** This allows users to use photo compression technologies for maps and scenery imagery.
- ➔ **Failures and damage**, with basic system failures as well as limited structural damage.
- ➔ **Enhanced visuals and weather effects and aircraft systems.**

For More Information

Terminal Reality

<http://www.iflytri.com/Fly2K.asp>

GetWeather

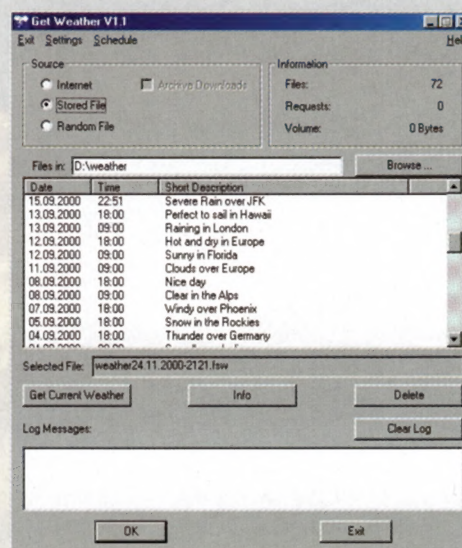
Freeware from Bearsoft

GetWeather is a server program for Microsoft Flight Simulator 2000. The program communicates with the Flight Simulator using the built in "Real-World-Weather" function. It allows you to download weather scenarios on hard disk for later use, making it unnecessary to connect to the Internet every time you would like to update the weather.

For More Information

Bearsoft

<http://www.bearsoft.de>



NOTAMS: New Products

Italy 2000

From Lago

This downloadable scenery package for Microsoft Flight Simulator 2000 consists of airports on the Italian peninsula includes night light effects, buildings, taxiways, docking systems and the other details.



For More Information

Lago
<http://www.lagoononline.com/ENG/PRODS/IT2K.HTM>
SRP: Euro 29.99 (about \$27.50 U.S.)

FS-Fault

Freeware utility by Ray Sotkiewicz

FS-Fault is a program that runs in the background of FS 2000, connected to Flight Simulator 2000 through the FSUIPC by Pete Dowson. The program gives virtual pilots more control over the failure systems in the simulator with an easy to use interface.



For More Information

Ray Sotkiewicz
<http://www.avsim.com/cgi-bin/library/jump.cgi?ID=8906>

Online Approach Charts and Airport Diagrams

At the Echo Flight Web Site

Echo Flight now lets you view their digital NOAA Approach Plate scans on the web.



The full set of digital plates is also available on CD-ROM to EchoFlight subscribers.

Just enter the airport ICAO identifier and you can view:

- ➔ Standard Terminal Arrival Charts (USA)
- ➔ Facility, Standard Instrument Departure
- ➔ Instrument Approach Procedure Charts

For More Information

Echo Flight Web Site
<http://edj.net/cgi-bin/echoplate.pl>

Real Airports

From Just Flight

This new scenery package from Just Flight features the world's busiest airports recreated for Microsoft Flight Simulator 2000, including:

- London Gatwick
- Paris Orly
- Milan Malpensa
- Cologne/Bonn Konrad Adenauer
- Houston George Bush Intercontinental
- Zurich Kloten
- Rio de Janeiro Galeao

The scenery includes custom runway and taxiway lighting, realistic ground markings, authentic-liveried aircraft, static ground vehicles, dynamic aircraft and ground vehicles. Working gate docking systems and six ATC adventures, comprehensive charts, and a printed manual with instructions and airport diagrams are also included.



For More Information

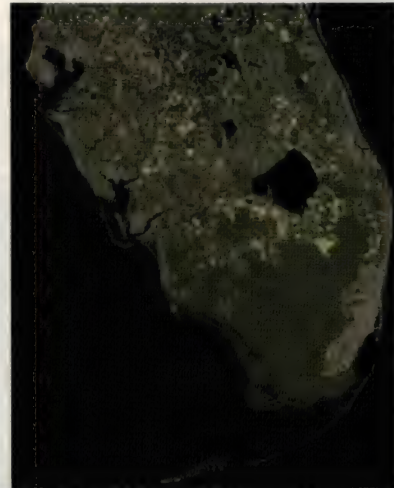
Just Flight, Ltd.
Units A2/A3 Edison Road, St. Ives,
Cambridgeshire PE17 4LF, UK
Internet: <http://www.justflight.com>
SRP: £29.99 (about \$ 43.50 U.S.)

Miami Scenery for Fly!

From Scenery USA



This release includes major cities and towns in the Miami area, including Boca Raton, Fort Lauderdale, Fort Pierce, Fort Myers, Key West, Melbourne, Miami, Sarasota, St Petersburg, Tampa, West Palm Beach



For More Information

Scenery! USA
Author: Peter McLean
<http://www.flyscenery.com>
SRP \$25.00 Australia Dollars (about \$16.00 U.S.)

NOTAMS: New Products

Airport 2000 Volume 3

From Wilco

Expected for release by the time you're reading this, Airport 2000 Volume 3 is a scenery, aircraft and adventure package for Microsoft Flight Simulator 2000. This new version of the Airport 2000 series includes 7 new airports, adventures, and 3 new aircraft with sound.

Airports included in the package will be:

- France : Paris only
- Denmark : Kastrup Copenhagen
- Germany : Berlin Tegel
- United Kingdom : London Gatwick
- Denver International
- San Francisco International
- Seattle Tacoma

The scenery includes gates with dynamic jetways, accurate taxiway signs, night lighting effects, and dynamic traffic. Eight new adventures for flights between the airports in Volume 3, and two new adventures linking airports between Volume 3 and Volume 1 are included. The adventures feature audible checklists and crew announcements/cabin calls, and vocal captain calls/readbacks

The aircraft feature animated parts, custom panels and FMC:

- Airbus A320
- Boeing B737-800
- Dornier 328

A printed manual with adventure instructions, airport diagrams is included. SID's and STAR's. charts are also included on the CD-ROM for a 1:1 scale printing



For More Information

Wilco Publishing
P.O. Box 30
1620 Drogenbos Belgium
<http://wilcopub.com/nonfls/a2000v3.htm>
SRP 41,85 Euro (about \$ 39.00 U.S.)

WhazzUp V1.20 Build 177

Freeware from Enrico Schiratti

WhazzUp is a preflight tool for PC Controllers and SB Pilots, with a graphic representation of the Controllers and Pilots lists found on various web pages. The version brings some big changes in way the program operates. It's no longer associated with any network and can be used more like a data browser, that may or may not be connected for the benefit of the pilots and controllers. A new configuration file (currently including IVAN and SATSERV) has been added, and the new system allows the operators of the networks to mirror data just about anywhere, whether it is in the same location of their SB/PC servers or not.



For More Information

Enrico Schiratti
<http://www.schiratti.com/whazzup.html>

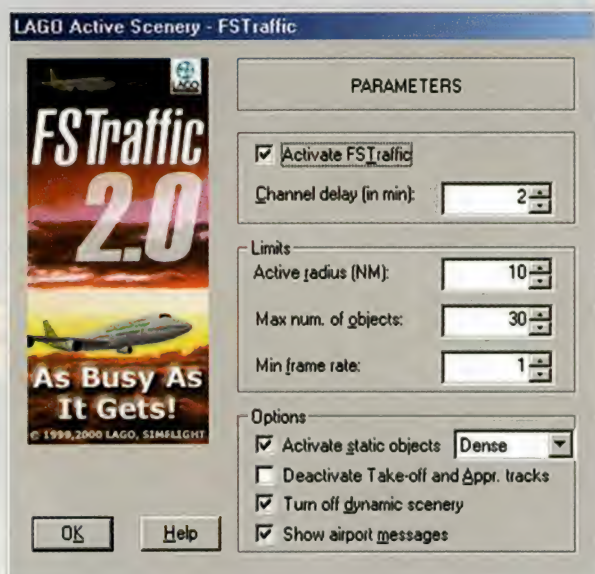
FSTraffic 2

From Lago

Lago has released version 2 of their popular FSTraffic program, which allows you to generate Artificial Intelligence (AI) traffic around any airport in the world, separate from the dynamic scenery engine of Microsoft Flight Simulator. Version 2 is a free upgrade for registered users of FSTraffic.

The new version includes the following refinements:

- ➔ Better defined and more realistic aircraft plus 3 ground vehicles.
- ➔ The ILS Traffic database building feature will start automatically.
- ➔ Airlines/Areas concept allows customization of traffic so that only suitable aircraft are seen on specific tracks.
- ➔ Planes built with recent plane design and modification tools can now be converted.
- ➔ A fully functional FSTraffic Tracks Editor.
- ➔ Three new classes of planes have been added to the Aircraft Class list: Commuter, Cargo and User Definable.
- ➔ For the FS 2000 version only: the scenery and textures that are used to display the aircraft are now stored in a separate Scenery/Texture directory.



GF-45 Flight SIM Avionics Unit

Enhance your SIM cockpit with real knobs and active lighted displays. Combine multiple units to create a custom panel to represent NAV1, NAV2, XPNDR, ADF, COM radio functions. Installation is plug and play with USB and the most popular SIM programs.

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Beaverton, OR 97008

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Fax 503.671.0168
www.goflightinc.com
Info@goflightinc.com

For More Information

Lago
<http://www.fstraffic.com/frame.htm>
SRP (new purchases) \$29.99



One of the neatest activities for on-line flying is participating in *fly-ins*. This is when many on-line pilots and controllers converge on a particular area or location during an announced time period, under the guidance of an organizer or sponsor. In this article, we'll look at some recent examples of online fly-ins, which will provide an overview of how to get information on fly-ins and how to participate as an online pilot.

Consistent with the usual content of this series, the controller side is not explicitly covered, but one obvious key to having a great fly-in is having good controller coverage. I'll describe some of the new features at the end of this article that can help simulation pilots get a variety of aviation information through the main SATCO-affiliated web sites.

Fly-In Overview

What we'll see in the descriptions of four fly-in examples is that first someone needs to organize the fly-in. Some are organized by the SATCO ATC organization for a particular Air Route Traffic Control Center (ARTCC) — or equivalent organization in other parts of the world. In other cases, they're organized by virtual airlines for a particular hub or by those associated with a particular country or area.

About the author

Doug Horton had some U. S. Navy flight indoctrination at Pensacola, then spent twelve years of active duty in nuclear submarines, with over 10,000 hours underwater. Since then, he has spent over 20 years in corporate and consulting jobs related to business management and technology, logging more than a million miles as a commercial air passenger. During 10 years of flight simulation experience, he has been a frequent beta tester and writer. In the past year, Doug has completed Private Pilot certification and is now working toward an Instrument Rating.

By Doug Horton

A time is set and arrangements are made to schedule the number of controllers required to handle the anticipated aircraft traffic. In some cases, these are one-time events, while some are scheduled on a regular basis. An announcement is made, which you may find on flight simulation web sites such as www.avsim.com, www.simflight.com, and other locations.

Simulation news sites will point to the fly-in announcement on the host web site, and there are usually many subordinate web pages to provide complete information, such as fly-in departure and arrival procedures, controller and flight scheduling, and charts for departures and approaches. Often, there are sign-up requirements for pilots to file flight plans in advance and/or get landing "slots." In the example fly-ins below, we'll see some of the information provided for each of these, as well as some statistics from each, relating to controller and pilot participation.

Denver ARTCC Fly-In

Our first example is a fly-in to the Denver, Colorado area called the "Rocky Mountain Rumble," which was held on January 14. The SATCO Denver ARTCC, led by station chief Jeff Turner, who provided information for this article, sponsored this fly-in.



As mentioned above, a fly-in begins with a web page announcement, and in this case the announcement was located on the SATCO Denver ARTCC site. The announcement provided the date, time, general information and, most importantly, it also provided subsidiary web pages for controllers to sign up and for pilots to file flight plans.

Clicking on the Controllers page showed what positions were filled, the associated frequency to use and which SATCO member would staff the position. Clicking on the flight plans list popped up a form in which pilot participants were asked to fill in flight plan particulars. This form transferred to a spreadsheet that the fly-in staff used to get an overview of planned flights. This table shows the actual SATCO controller assignments for the fly-in.

Participating in Fly-Ins

Flying with SATCO!

Flying With SATCO

Position	Frequency	SATCO Controller
DEN_E_CTR	135.60	Nathan Harwood
DEN_W_CTR	132.70	Michael Kroth
DEN_APP	119.30	Nate Johns
DEN_DEP	126.10	Mark Zameda
DEN_TWR	124.30	Jeff Turner
DEN_GND	121.90	Dick Snaer
COS_APP	118.50	Robert Shepard

Here are some post-fly-in statistics from station chief Jeff Turner, who reported, "I show 101 flights participating with 49 departures and 52 arrivals during six hours of operation, and 47 of the total were using voice. This is just in and out of Denver (KDEN), and it does not include Eagle County (KEGE) or Colorado Springs (KCOS), although those were few. This day also set a new record for online users for SATCO at 479 at one time. What a blast..."

Netherlands/Belgium Regional Fly-In

While many fly-ins are special events and are often scheduled on weekend days, SATCO members in the Netherlands and Belgium sponsor a regularly scheduled fly-in on the first Wednesday evening of every month. You can find details on their website, including links for procedures, charts and controllers.

After the February 7th fly-in, co-organizer Steve Gryskiewicz, who lives in Maastricht, Netherlands, reported that over 80 pilots participated with flights into and out of the airports used for the fly-in. Most routes were within the Netherlands and Belgium, although the longest routes were to and from the UK, with Steve personally controlling a DC8 from Gatwick, and controlling two 747s from the Canary Islands.



For those interested in flying in The Netherlands area, there is also a monthly fly-in sponsored by the Amsterdam VACC. Their site is filled with information about the area and numerous downloads, and the site is worth visiting just to see the Shockwave-enabled introduction and attractive site design.

Toronto Fly-In

The Toronto Fly-In on February 24 was announced on the Toronto FIR (center) site. Clicking on the Events link, users would find the main web page for the fly-in, with links on this page to a Pilot Pages and Essentials that contains further details. Also, there were links to Toronto-Pearson (CYYZ) airport and terminal diagrams.

Participating In Fly-ins

Toronto FIR Events



Toronto to host the world with...
NAV CANADA ATC's in CTR and APP
CZYZ Toronto Fir Fly in Saturday 24th from
1900Z-2300Z (14:00 EST to 18:00EST)

Introduction
Toronto is holding the biggest Virtual Airline Fly in to date. More than 7 Virtual airlines expected. For the first time ever, Toronto will have two NavCanada Controllers

Pilots:
General
All pilots unfamiliar with Toronto Fir Airspace and procedures should read [Pilot's Guide](#). These highlight some small significant differences, being prepared, which will help make your experience more enjoyable. The page also contains preferred IIS routing to almost all major cities.

Charts:
Please download Profile Descent Charts for Toronto Pearson International from [Pilot's Guide](#).
For the fly-in use these procedures:
* All the Charts are edited for printing. Please take some time and print out the appropriate charts.

Toronto Lester B. Pearson International CZYZ

Toronto Ground

Terminal 1

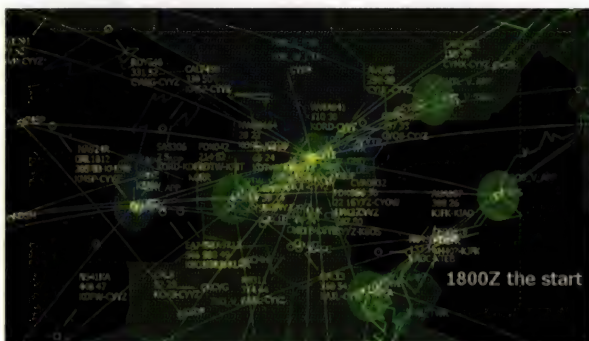
Terminal 2

Terminal 3

On the Toronto FIR web site you'll see links on this page to Pilot Pages and Essentials, which contained further details.

The Essentials page contains links for downloading Toronto FIR and CYYZ Ground sector charts for ProController, as well as a link for downloading all approach charts and the unique departure chart. By the way, the approach charts for Canada are different than those used in the U.S., where STARs would be used. In this case, the approach charts are called Profile Descent charts, and unlike STARs, they are specific and directional for each main runway.

The Toronto fly-in included real air traffic controllers Dennis Sander and Chris Brew, who just completed their NavCanada ATC training. The Ground/Clearance controller position was staffed by real 737 pilot Steve Weither from WestJet, based in Calgary. The fly-in was scheduled to start at 1900 Zulu, but excited pilots began to gather in the area at least an hour earlier.



WhazzUp screenshot of the Toronto fly-in, taken at 1800 Zulu.

The Toronto fly-in proved to be a very popular destination for SATCO members that day. Maybe it was the attractiveness of this well organized fly-in, or the

continuing growth and interest in online flying with SATCO, or maybe it was just good weather to stay indoors for some virtual flying that day. It was certainly cold, rainy, and windy in the Chicago area where I live, and I imagine that the weather was equally good for staying indoors in many parts of the SATCO world.

According to fly-in staffer Haroon Anwar, more than 100 pilots participated in the fly-in. The busiest sector during the fly-in was Toronto West FIR, which in real life handles a great deal of arriving traffic as well as overflying traffic from Detroit, Chicago, and Cleveland. The greatest fly-in traffic flow was between Toronto, Montreal, New York (JFK), and Chicago. The longest flight was flown into Toronto from Moscow! As highlighted on the Toronto SATCO FIR "afterglow" web page, which was posted after the fly-in, "Toronto held the biggest virtual airline fly-in to date. More than seven virtual airlines and many more pilots arrived in the four hours of the official event. We built it and they came in droves!"

Nor'easter Fly-In

This fly-in was conducted on Sunday, February 25, 1400 - 2000 local (1900 - 0100 Zulu). It was sponsored by the SATUSA Eastern Region, which provided controller coverage for all major airports in the northeastern U.S. The introductory web page provided the customary links to other pages with instructions, procedures, and charts.



This web page also provided very specific "big picture" instructions that can be helpful to all SATCO pilots participating in fly-ins, as well as just "flying with SATCO." Those who are new to SATCO should be aware that SATCO controllers are specifically trained, tested, and qualified for

Nor'easter Fly-In Instructions

All pilots must be registered with SATCO and must use the Squawkbox flight simulator add-on.

Filing Your Flight Plan

The Boston, New York, and Washington DC ARTCC's have excellent resources in their web sites for finding preferred routes. Each participating ARTCC has reservation specialists for all arrivals and departures. Each flight plan request will be reviewed against established, preferred routes. Pilots filing unacceptable routes will be notified of a new routing by one of our reservation specialists. Flight plans are filed based on a "local" time, which means Eastern Standard Time (GMT - 5hrs). (Author's Note: Pilots were asked to select route and flight plan from hot links to Boston, New York, Washington, and Transatlantic ARTCC reservation pages.

Voice Communications

Roger Wilco will be used for this event. When checking in with a controller for the first time, simply say your aircraft ID and standby. We expect high volume and prefer to streamline voice communications wherever possible. If you do not get a response within a minute, then try to contact the controller again. If voice communications fail, please contact the controller on text. A complete set of instructions regarding IP's to be used and appropriate voice procedures will be available to all pilots that make an arrival or departure reservation.

Those aircraft with advanced flight reservations will be given first priority.

Upon completion of a reservation request form, our team of reservation specialists will review your flight as well as your requested altitude and send you a confirmation e-mail with any amendments that they may have made. It is very important that you pay attention to the route and altitude as well as the ETD/ETA since these may have been changed to accommodate traffic loads. Those pilots with confirmed reservations prior to flight day will receive *Priority Handling* over all other aircraft requesting ATC services. As indicated above, flight plans are filed based on a "local" time, which means Eastern Standard Time (GMT - 5hrs).

Know thy airplane!

This event is NOT the time to try out a new airplane! The arrival and departure lanes for this airspace leave little room for pilot error. We are counting on your ability to follow ATC instructions and to be able to maintain altitude, heading, and speed when instructed to do so. Truly erratic flying will not be tolerated and may result in a pilot being removed from the network.

Adhere to ATC instructions & FAA Regulations.

Please observe all FAA regulations including the following: aircraft shall not enter Class Bravo airspace without contacting ATC first. This includes departing an airport! Do not takeoff without hearing the words "*Cleared for Takeoff*". NOTE: [KBOS] Boston's Class B airspace is closed to VFR traffic for this fly-in. Also, aircraft *shall NOT exceed 250kts while below 10,000' altitude*.

Practice your flight. We highly suggest that you practice your route a couple of times before the event. Practice will not only insure that you have all of the equipment and charts, but it will also familiarize you with local ATC procedures. Also, if you are planning on arriving at night, make sure you practice flying at night!

Participating In Fly-ins

their positions, while SATCO pilots are not. Thus, the Eastern Region controllers offer their suggestions to participants on what SATCO pilots can do to improve the online flying experience for themselves and other participants.

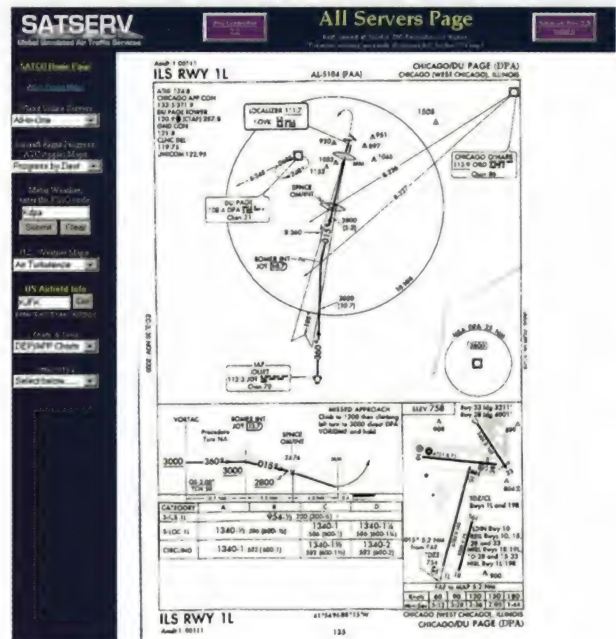
This event was very successful, as during the fly-in and a coincident fly-in in the UK, a new SATCO online record was set, according to SATCO Executive Director Randy Whistler. The total number of controllers and pilots operating simultaneously throughout the "world of SATCO." was 568. Perhaps this will be topped during the next fly-in. Participate and you may be part of a new record!

SATCO/SATUSA/SATSERV Website Tools

The main SATCO homepage has been updated to more clearly show all its features and links. In exploring the links, I've discovered a web page that contains an amazing amount of real aviation information that can be used for online flying or just information for curious real or virtual pilots. The link to this page is <http://www.satusa.org/servers/allservers.htm>. The opening page takes the place of the previous SATCO home page link for "Who is online." This page lists servers, controllers, and pilots currently online. With the drop-down selection lists, I found that this list could be sorted and displayed on other pages by departure or destination locations. I discovered this during the Toronto Fly-In, so I was immediately able to see how many flight plans were in progress for departing from or arriving at CYYZ.



The Echo Flight web site can display all current and official departure and approach charts from the complete NOAA chart books.



A drop-down box on the All Servers page provides a link to DEP/APP Charts

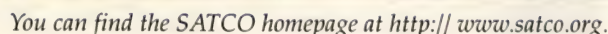
Much "hidden treasure" is accessible through all the drop-down selection boxes on the left side. For example, there are links that show a variety of U.S. real-time weather maps, including a map of current surface conditions. If you look at the open drop-down box in the figure showing surface conditions, you'll see a link to DEP/APP Charts. Clicking on this provides the following page, which is provided by Echo Flight. This site can display all current and official departure and approach charts from the complete NOAA chart books. You can see that the current charts are effective from January 25 to March 22, 2002 (subject to modification by NOTAMs).



The SATCO All Servers web page that contains an amazing amount of real aviation information that can be used for online flying or just information for curious real or virtual pilots.

As I've been working on my real Instrument Rating, I fly from Chicago/DuPage Airport (KDPA). With just a few clicks, I can pull up the current Official NOAA approach plates, such as the accompanying plate for ILS runway 1L. This service is obviously very helpful for both real and simulator pilots. I invite you to discover all the other wonderful "treasure" that can be linked from the All Servers Page.

You can find the SATCO homepage at:
<http://www.satco.org>



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Information on the Toronto Fly-In

The Echo Flight website

<http://www.echoflight.com>



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Pacific Crossing

By Al Pelletier

Back in October 2000, I had a once in a lifetime opportunity to accompany an Air Canada crew for a full cycle on a trip to Seoul Korea from Vancouver Canada. My experience isn't all that much different than the "Fantasy Flight" article by Doug Horton in the October/November 2000 issue, but of course, a lot more fun for me! As you'll recall, Doug was the guest in an Air Canada Airbus A320, for a landing at Chicago's O'Hare airport. Having been there, I could feel and understand Doug's excitement while reading his article. Doug has the ability to make the reader become part of the

experience and I'll try to do the same while you are reading about my journey.

My flight differs from Doug's in that the trip was planned and I had a jump seat in the cockpit all the way there and back, which made it even more fun. The purpose was to live and observe a full crew cycle and see all the work first hand. All the planning and problems that we passengers are not aware of when travelling. Also, to learn about the cockpit and operations of a Boeing 767-300ER.

Now I hear you ask: "How does one talk themselves into the cockpit of a commercial airliner for 22 hours of flight time?" The answer to this question is that it takes a bit of luck, an idea, and knowing a 767 Captain (like I do) certainly helps. I met Captain Perry Walker in my computer store three years before, when he

With Air Canada



purchased a system from me. Although I'd tried my best at the time, I couldn't get him interested in looking at Flight Simulator. However, Perry came back to purchase another system in September 2000, and I had the chance to sit him down with a cup of coffee and demo Flight Simulator 2000. He sat back and watched as I flew a DC9, with Paul Golding's great panel. I shot a few approaches at New York's La Guardia airport. I flew some of it in good conditions and some at night with low visibility. Captain Walker was amazed at the improvements and flight model accuracy brought on by Flight Simulator 2000. He was a pilot on Air

Canada DC-9s for many years and pointed out that the panel and instrument layout were very accurate, especially the Auto Pilot features. He realized that this was a great procedure trainer.

We talked for a while about his becoming Captain on 767-300ER since our last meeting and his present route: Vancouver to Seoul. He offered to take me along. They are entitled to 8 "buddy passes" per year and he would give me one should I want to go. I had to think about this for about two seconds before I said "yes." I, being a columnist and sometime opportunist, jumped at the idea for an article. I wanted

Pacific Crossing



The Air Canada 767-300ER instrument panel (above) and our aircraft being prepared in Vancouver, B.C. (below).



to find answers to many questions and write about what I learned. How much work was involved in these extended over water flights? How long are the trips? How exciting or boring are the flights? How complicated is a 767-300ER to handle? How's the crew rest? Etc...Also, knowing that the Boeing 767 is one of the favorite airliners for flight simmers, I wanted to write an article that would make the reader feel as if they had experience a full cycle across the Pacific Ocean, thus making computer flying of this aircraft feel more realistic.

The preparation and pre-flight requirement

First, I would need a valid passport. Done! I was given a flight number and time:

Air Canada FLT 899 departing Vancouver 23 Oct 2000 1300 Local. I took an Air BC Dash 8 Flight to Vancouver from Comox, where I live, and met Captain Walker for briefing and flight planning. Then we passed through security and made our way to the airplane. I had been instructed to have with me just a carry on size bag. On board the 767, Captain Walker assigned me the jump seat on the port side and just behind the Captain's chair. My luggage fit underneath the seat and I was set to watch the pre-flight.

At this time, First Officer Stephen Rogers and First Officer Richard Roskell joined us. For **ETOPS** (Extended Twin OperationS) of over 8 hours, they require 3 pilots on board. One observation here is that the pilots didn't really know each other. Both First Officers had never flown with each other or with the Captain. I asked why that was and they reply that flying for such a large Airline and bidding for your routes, this was a common happening. The head Flight Attendant, Marge, stuck her head in the cockpit and introduced herself while bringing in some sandwiches, water and a garbage bag. She also hadn't flown with any of the crew before, except maybe with the Captain, she said.

The checklists came out and all the switches were checked and set in their proper position. Captain Walker started to program the flight details into the FMS. The

Pacific Crossing



FMS is the brain of the 767. It has in its database all the information needed for the Navigation and Communication needs for the entire routes flown by Air Canada 767's. This includes information about airports, waypoints, radio frequencies, SIDS and STARS. The First Officer, using the Multi Function Control and Display (MCDU), located next to his knee, starts punching in the numbers that the Captain is reading to him from the Flight Plan print out for this particular flight. While this is being done, the second First Officer, Richard Roskell, acts as the quality control. He monitors all the entries to ensure that no mistakes are made. Real team work here.

After the flight data inputs are completed, the checklist for pre-start up is being followed. Flaps, spoilers, radio frequency, throttle levers, circuit breakers are all checked.

I must mention here that there was a lot of gray hair in the cockpit. It usually takes 20 to 22 years with Air Canada to become a skipper on "heavies." Both First Officers had been flying for over 20 years.



Overhead panel of the Air Canada 767-300ER (top) and Center console of the Air Canada 767-300ER (above).

Start-up, Taxi and Departure

The pre-flight and pre-start checks were completed. The catering was on board and the passengers had embarked. We were now on APU power. Tower gave permission and the mule pushed us back away from the gate. Both engines were started and we were ready to receive clearance. Both engines were running smooth. There is very little noise in the cockpit. Nothing is done on intercom, except for radio communication.

"Ground Control, Air Canada 899 ready to taxi."

"Air Canada, Ground, Taxi to holding point for RWY 26L Left via Delta. Contact Departure on 132.9, good day sir."

"Departure, Air Canada 899, Heavy, taxiing to holding for RWY 26L, Ready for clearance"

"Air Canada 899, Roger. AC899 is cleared to the Seoul Kimpo airport via Comox, Port Hardy, flight plan route, Flight Level 320"

The First Officer read back the clearance and we were taxiing out to our holding point. While taxiing and waiting in line for take off, Captain Walker went through the Before Take Off checklist. We had now been passed to the tower frequency from control.

"Air Canada 899, taxi to RWY 28L. You are cleared for immediate take off. Wind 270 at 8"

Captain Walker applied some power to move us in position and then applied full power. I was very fortunate

Pacific Crossing

here to have a clear look at the airspeed indicator. We were at Max Take Off Weight (MTOW). I have a picture showing us at 165kts just before rotate.

"V one. Rotate. Positive climb, gear up"

The F/O brings the gear lever in the up position and the green light go out. We're on our way. Tower passes us back to departure on 132.9

"Departure AC899, heavy passing through 4000"

"AC899, good day sir, radar contact, climb to FL320"

The Crossing

We passed right over Comox, my home, from where I had departed by Dash 8 that morning. Sunshine was now filling the cockpit. Since it would be afternoon for 12 hours, the sun was with us for the whole duration. Shades went up all over the place to keep the cockpit cool. In the cabin, the flight crew was busy getting the first in flight meal ready for the over 200 passengers on board.

We were still under Vancouver control for position reporting. Our flight would take us over the north tip of Vancouver Island, over the Queen Charlotte Islands, then into the Anchorage Alaska control passing about 200 miles south of Anchorage itself. Then on to a point over Kodiak Alaska, the Alaska Peninsula, the Aleutian Islands, just south of the Russian Federation, northern Japan, the Sea of Japan and on to South Korea, making sure we do not over fly the North Korean airspace for obvious reasons. Our controlling agencies were Vancouver, Anchorage and Tokyo. Position reporting was done at every compulsory point, giving the position, altitude, fuel remaining, time and next compulsory reporting point. Typical radio call:

"Anchorage, Air Canada 899 "

"Air Canada 899, Anchorage."

"Air Canada, over ONEOX, time 0130 zulu, FL 320, fuel 12 hours, NANDY next, over."

"AC 899 this is Anchorage, Roger, out."

We reached our altitude about 200 miles out of Vancouver. Captain Walker left it to the First Officers to come with a rotation schedule for rest time during the flight. It was decided that they would rotate every 2 hours. Copilot to Pilot, and Pilot to rest seat. Three seats are set-aside in first class, or "J" class as referred to by aircrew, for crew rest during the crossing, one for pilots and two for crew. A black out curtain is drawn around the seats.

Since this magazine is about Flight Simulation and airplanes, I think it's now time to talk about the 767-300ER. Let's have a look at the plane itself, the panel, the overhead and other systems of this great plane. The Boeing 767 aircraft came into service on the 26th of September 1981. From the outset, the 767 were available with two different engine configurations, the Pratt & Whitney (JT9D) and the General Electric (CF6). The customer preference would dictate which engine would go on which plane.

The 767-300ER (**E**xtended **R**ange) was announced in January 1985 and came into service in 1988. They are powered by GE CF6-80C2B6 engines and have an awesome gross weight of 184615 KG (407,000 LBS). ER versions of the 767 in both short and long fuselage configuration have proved popular overseas, especially to small operators seeking new jet equipment but without the expense and capacity requirement of a Boeing 747. The approximate dimensions are: length 159 ft, height 52 ft, span 156 ft, wing area of 3050 square ft. This large wing area allows it the lift required to carry an enormous amount of fuel, which in turns allows for extra long-range operation.

In April 1988, an Air Mauritius 767-300ER flew 8727 miles between Halifax NS Canada and its destination, the Mauritius Islands (located 890 km east of Madagascar on the East coast side of Africa). The flight lasted 16 hours and 27 minutes and set a distance record for twinjet.

First Officer Stephen Rogers pointed out to me that at full throttle the engines are still running at only 70 percent of their capable output. In other words, he adds, it is a perfect perpetual engine. Just feed it fuel and it will run forever since at full power it's really only running in second gear, sort of speak.

The cockpit was very quiet. All the talking in between the crew is done in normal voice and not on intercom. I had been flying a 767 in FS 2000 to prepare me with the cockpit. As the photos show, Air Canada's 767 have a mixture of (affectionately known as) "steam driven" instruments, and some glass cockpit technology. It is not a full glass cockpit airplane, but close to it.

The Flight Simulator airplane I used was done by Project Opensky, and repainted in Air Canada liveries by Patrick Hanna. I also found a very accurate panel by Manuel Urrutia Avisrro (B767RPNL.ZIP) at flightsim.com. This prepared me surprisingly well. It took no time at all to figure out the actual cockpit layout and the overhead panel. This was found to be very interesting by the three pilots, none of who had ever used Flight Simulator before.

Back to the flight. The next 10 hours went surprisingly quite fast for me. Time was spent asking questions about all the different gauges, switches, and procedures while

Pacific Crossing

Many thanks to Captain Perry Walker, First Officer Stephen Rogers, First Officer Richard Roskell, and to the entire crew of AC Flight 899/898 for making feel right at home, and for their great hospitality.



keeping an eye on our progress across the Pacific Ocean, by listening to the position reporting and the other aircraft above and below us. To keep the time going by a little faster, a few old war stories were told, all in between a couple of meals and some shuteye in first class.

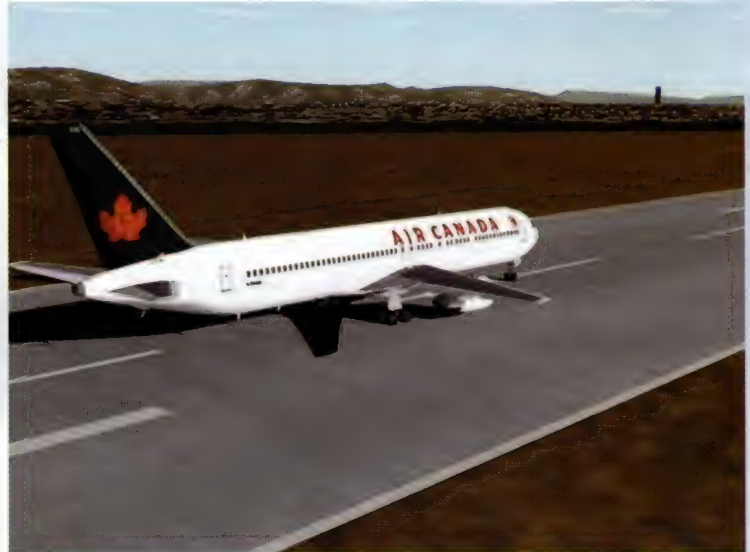
Air Canada was very gracious in providing me with a first class seat to go along with my jump seat. All three pilots were also owners or ex owners of small private planes. Our first officer used the phrase “carb heat” with a bit of a wink and a grin towards me while turning on the engine de-ice. Most of the guys flying those big airplanes are also small plane flyers and hands on pilots.

The Descent and Arrival

Somewhere over the Sea of Japan, we began our descent. I was a bit surprised by the use of the spoiler lever by the Skipper to slow the airplane down. Something we can't simulate in Flight Simulator, he uses the spoiler lever just like a brake. We were told at one point to reduce our speed to 215 knots, while in descent. The only way to accomplish this was to grab the spoiler lever and pull on it, almost like pulling a parking brake lever in a car. He can apply as much or as little pressure as he needs to slow down. In any of the current crop of flight simulators, as far as I know, you can only have the spoiler fully deployed or fully retracted.

We were now under Korean airspace control. We were passed on to Seoul arrival and Radar vectored to intercept the Localizer for an ILS to runway 32R at Seoul's Kimpo International Airport. The weather conditions weren't that good, with moderate rain, 3 miles visibility and a temperature of 10 degrees C. I also found it very smoggy on final.

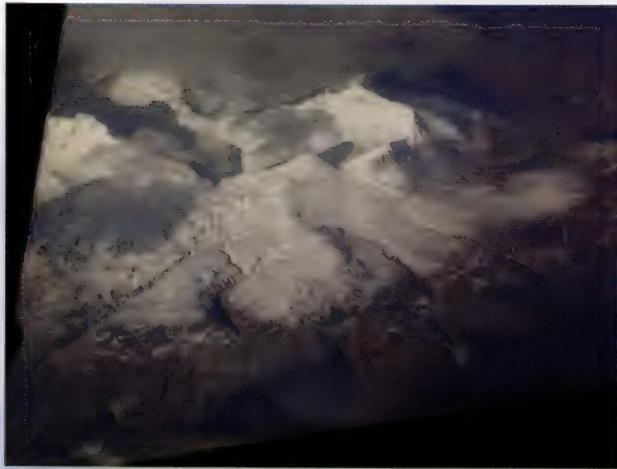
The autopilot was used at all time for turns, descent and airspeed. We intercepted the LOC and the autopilot flew



The Project Opensky 767-300ER for FS 200 in Air Canada livery (above) and Manuel Urritia Avisrrior's FS 2000 panel (below).



Pacific Crossing



Over northern Japan (top); On final at Seoul in low visibility (above); Getting ready to rotate at 165 knots (bleow).



us down the corridor. The pre-landing checklist was read aloud:

Flaps: "set"

Gear: "down, locked and three greens"

Spoilers: "armed"

Altimeter: "29.98" set

Crew Briefing: "Flight Attendants, set cabin for landing"

At about three miles back and 1500 feet above Captain Walker gave the order:

"Taking over manually."

"Check you are taking over manually" Replied the First Officer. "Autopilot coming off."

"Roger. Autopilot coming off" acknowledged the Skipper,

He proceeded to fly the big bird down without the aid of the autopilot. A familiar feminine voice announced "Autopilot, Autopilot" until turned off by pressing a button to shut her off. Every bit like a PC flight simulator!

We went through minimums, a last gear check, and we landed at Kimpo.

The landing was smooth and we taxied to the International Terminal. I saw more 747-400's at this airport then I had ever seen before. All painted in the Korean Airline powder blue colors. It was 5:20 PM local. This had been the longest afternoon of my life. We had departed at 1PM local Vancouver time and 12 hours later landed at Seoul at 5:20 PM.

Crew Rest

We had just finished 12 hours of flying and a couple hours of pre-flights and planning. I felt like a rag. We were transported to our Hotel, the Seoul Hilton, in a bus provided by the Hotel. The ride took about an hour and provided me with a great scenic tour of Seoul. The crew was very quiet during the ride. All had been there before and all were very tired and jet lagged. We had as part of our crew two flight attendants that were from Korean origin and spoke the language.

- Story concludes on page 80

Flying the Golden Gate

By Doug Horton

Two weeks after the excitement of my Private Pilot certificate last year, I had a business trip to the San Francisco area, where two of my sons and their families live. I lived there two different times many years ago, and it has always been one of my favorite places to visit. From years of driving around the area, and from enjoyable flight simulator sessions with the beautiful scenery of Flight Unlimited II, I decided that an air tour of the Bay Area would be a high priority after getting my

certificate. By the way, a sub-title for this article could be "A beginner's guide to understanding San Francisco airspace."

After arrival in the Bay Area last November, I called a flight school at Livermore Municipal airport (KLVK) and reserved a Cessna 172 for Saturday afternoon. As I was not a student of this school, I was told that I would need to either pass a checkride in their aircraft or take along an instructor. I chose to take along an instructor because I needed



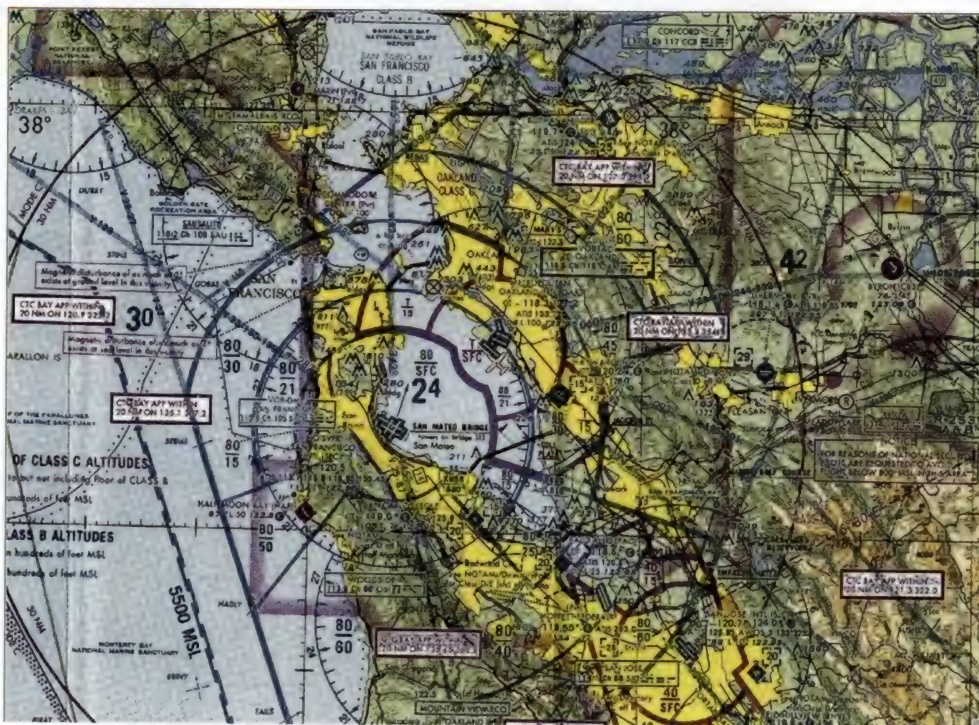
Flying the Golden Gate

help working my way through the busy San Francisco airspace. I jotted down the rental rates, and they were higher than my club rates. However, this was not a question of “how much,” rather, it was “how soon” at almost any price. I was also told that I’d need to bring my FAA medical certificate and Private Pilot certificate.

On Saturday, my son Keith and I arrived at Ahart Aviation, and after doing the paperwork and a thorough preflight inspection, we got into the aircraft with an Instructor. As a certified Private Pilot, I would be Pilot in Command with the Instructor just coaching me on the local area from the right front seat. I’d studied the local airspace from my purchase of a Terminal Area Chart for San Francisco, and I wasn’t surprised to see that it’s quite complex, so an explanation is in order. Remember the subtitle I suggested?

The most significant airspace of the Bay Area is the Class B airspace for San Francisco International Airport (KSFO), which is one of the busiest in the world. Referring to the accompanying screenshot, you can see a portion of the San Francisco Section Chart in Fly!2k. The Class B airspace is represented by the blue rings surrounded by a magenta ring around the airport. The blue rings defines what pilots call the “upside-down wedding cake” over Class B airports. In this case, the inner ring surrounding KSFO has an indication of “80/SFC,” meaning from the surface to 8000 feet. Successive outward rings taper upward for their lower limits, while all rings have 8000 feet as their upper limit.

The most basic rule for pilots is that you can only enter class B airspace with a clearance from ATC, which in this case is called Bay Approach. White boxes appear on the chart that provide instructions on which frequencies to use for calling Bay Approach, reading “CTC Bay App within 20 NM on (frequency),” with the frequency depending on your aircraft’s location. The outer magenta ring is 30 miles out from KSFO, and it represents the typical Class B airspace “Mode C veil,” meaning you must have an altitude-encoding (Mode C) transponder within this ring and below 10,000 feet, so Bay Approach can read your altitude on their radar display.



Sectional San Francisco Sectional (taken from Fly!)



Checking out the Cessna 172 I rented at the Livermore Municipal airport.

Flying The Golden Gate

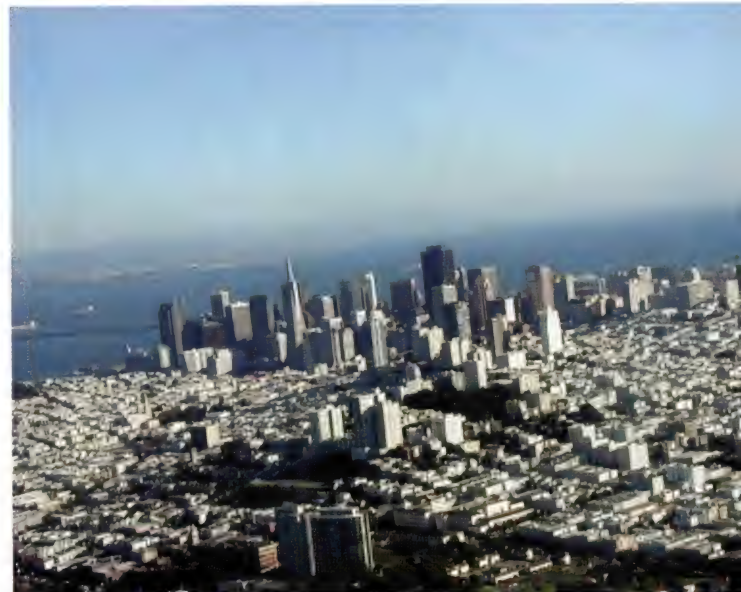
Flying over the south end of the Golden Gate Bridge at 1000 feet. (top) The infamous former Federal prison on Alcatraz Island. (middle) The familiar skyline of San Francisco. (bottom)

On the eastern side of the bay, you can see a set of two partial magenta rings denoting the Class C airspace surrounding Oakland International Airport (KOAK). You can visualize this as a two-layer upside-down wedding cake stuck underneath one side of the larger SFO upside-down cake. There are three magenta-colored vertical dimension indications shown. The inner ring is marked T/SFC, meaning from the surface to "T" for "top." This means the top of the Class C KOAK airspace goes to the bottom of the KSFO Class B. The two partial outer rings are marked "T/15," which indicates they go from 1500 feet MSL to the bottom of the KSFO Class B. You can see why I wanted to take a "guide" along, as I needed to thread the way from Livermore to the Golden Gate while staying outside and/or under the various layers. Specifically, you may be able to see that I could navigate under 6000, 4500, then 3000 feet lower boundaries of the blue rings as I traveled from Livermore to the Golden Gate.

After takeoff and climb we headed northwesterly over the low mountains east of Oakland and Berkeley, remaining completely clear of KOAK Class C airspace, and remaining under the 6000 and 4500 layers of the KSFO Class B. We checked in with Bay Approach, indicating our intentions for a "Bay tour." Obviously, we weren't the first to have this idea, and ATC is very familiar with daily requests for this service. Approach "roger" our request, and we received a new transponder code and then two frequency changes. Strangely, to me at least, we were not given any specific direction, and ATC didn't respond to our last check-in, nor did we hear "radar contact."

The Instructor coached me to just fly clear of the KOAK and KSFO airspace. He indicated that since ATC is often quite busy, they would just keep an eye on our unique transponder code, and we would remain responsible for looking for other aircraft. Flying just north of the University of California, Berkeley, we could see this famous campus and its familiar bell tower. Approaching the shoreline near the Berkeley Marina and the Eastern Shore of the bay, the instructor suggested I descend to 1000' to continue the tour. We headed westward across the Bay and toward the Golden Gate Bridge, passing directly over Alcatraz Island. I toured this infamous former Federal prison on two occasions (as a "tourist," not a "state sponsored long-term guest"), which is one of San Francisco's most popular tourist attractions, and it was very interesting to see it from the air.

After passing Alcatraz, a glance up and to the left revealed the splendor of "America's Favorite City" and the memorable downtown skyline of San Francisco.





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Nearly everyone can recall seeing this sight for the first time, including the notable Transamerica Building and its tall slender pyramid top.

With my son taking several digital photos, I flew over the south end of the Golden Gate Bridge, then began a slow turn to fly back eastward. It was quite a thrill to fly over the middle of the bridge at 1000 feet as the towers to our left and right are over 700 feet tall. I wondered whether I was in conformance with vertical and horizontal clearance-from-obstacles requirements, but I couldn't help thinking about the times that I'd flown under the bridge in various aircraft in the virtual world of flight simulation.

Flying back toward Alcatraz, I decided to circle around Angel Island, which is a state park and former military reservation. I'd lived in the San Francisco area twice, but I'd only seen Angel Island from the water. From the air, I was able to see the historic military buildings and a few old gun emplacements. After this diversion, we retraced our outbound route, and after flying over the Berkeley Hills, we saw Mount Diablo ahead of us. Over 4000 feet high, it is the highest point in the Bay Area. It's a State Park, and I'd driven to the top several times, but it was exciting to see the aerial perspective.

Approximately over the town of Walnut Creek, where Keith lives, I made a gentle right turn and we headed southeast toward Livermore. After getting the ATIS report, I called Livermore Tower and was assigned a "left base entry" for the secondary eastward runway 7R. As I turned toward final, I was asked to change to the longer main runway 7L, and I landed just past the numbers. After tying up the plane, logging my time, and paying for the rental and instructor, I counted this experience as truly memorable! Through my son's photos, I'm glad to share this experience with Flight Simulator World readers. By the way, my son's gift to me last Christmas was two hours rental credit for flying at Livermore. Guess I'll be flying in the San Francisco area again!

Getting Real

Obtaining Your Private Pilot Certificate

Part 3

In the last two issues, I've written about my experiences getting a real Private Pilot certificate in the U. S. I've described the basic requirements, flight maneuvers and cross-country phases of training.

In this article, I'll describe the last month of my training and the actual flight exam. Lastly, I'll provide my overall impressions of how my personal computer flight simulation experience related to my experiences in real aircraft. First, I need to mention how I changed from training in the Cessna 172 to the Piper Archer aircraft.

Transition to Piper Archers

I mentioned in Part 1 that finding an aircraft for training was one of my initial hurdles, and that I'd chosen to join a club for that purpose. I began with lessons in the club's Cessna 172, but immediately after I completed my solo cross-country requirements, it was taken out of service for its annual maintenance period.

Since it was tentatively scheduled to be out for a month, I had two choices: stop training until it was returned to service, or make a transition to the club's two Piper Archers. This transition would occur after completing my



By Doug Horton

Getting Real

certification anyway, because the club's Cessna 172 is used mainly for training. My instructor coached me through transition from the 172 to the Archers, with plans for me to use one of the Archers for the completion of training and my final flight test.

Officially, these are both Piper model PA-28-181, and they're part of the Cherokee family. Built in 1976 and 1980 respectively, the club's Archers are mechanically identical and fully IFR certified with only slight differences in avionics. The updated avionics of tail number N4419F includes a Trimble GPS and dual-frequency ("flip-flop") Comm and Nav radios. The aircraft with tail number N8150A has an HSI, and an RNAV system, along with a radar altimeter. Both planes have a heading-only autopilot, which can be slaved to the GPS or RNAV, respectively, or to the VOR1 NAV heading.

In case you've never heard of it, RNAV is a system through which VORs can be electrically "offset" from their real locations, as well as a few other functions. For example, the DPA VOR is about five miles west of the DPA airport. For navigating back to the airport, the VOR can be made to appear at the airport, so you can fly an inbound radial all the way back.

To make the transition to the Archers I needed to demonstrate all the required maneuvers previously learned in the Cessna 172, including slow flight, stalls, steep turns, landing pattern, and reference maneuvers. Essentially, I needed to complete the solo process again in both Archers, though I was able to do it with just a few hours flying each of the Archers.

I soon preferred the Archer to the Cessna 172, as it is a bit more airplane. The Archer is a little heavier, more powerful and, of course, the Archer is somewhat newer in design. The biggest difference is the low-wing design, and I find them easier to control and much easier to land. I think the Archer is easier to land for two reasons. First, there's more ground effect with the lower wing, so there's a cushion of air that eases the landing, and second, the view through the windshield provides a better aspect for controlling the flare. Even when I've occasionally returned to flying the 172, I don't flare as well.

Another difference in aerodynamics is having a "stabulator" instead of a horizontal stabilizer. The entire control surface moves, compared to just the trailing edge of a horizontal stabilizer, and in any trimmed position, the longer trim tab moves counter to the control surface. This is designed to make altitude control more stable. Finally, I like the low wing when I'm in the landing pattern because I can see the runway continuously; in addition, I can look for other



Fox Flying Club's 1976 Piper Archer N4419F (top); Fox Flying Club's 1980 Piper Archer N8150A (above).

aircraft that are in the direction I'm turning. In the Cessna, the high wing blocks the view in that direction.

Practical Test Standards

In getting ready for the flight test, I needed to study and fully understand the Practical Test Requirements (PTS), as these provide a "script" of what the pilot candidate must demonstrate to the examiner. The PTS includes all the information learned throughout the lessons, including:

- ❖ Preflight preparation
- ❖ Preflight procedures
- ❖ Airport operations, including takeoffs, landings, and go-around

Obtaining Your Private Pilot Certificate

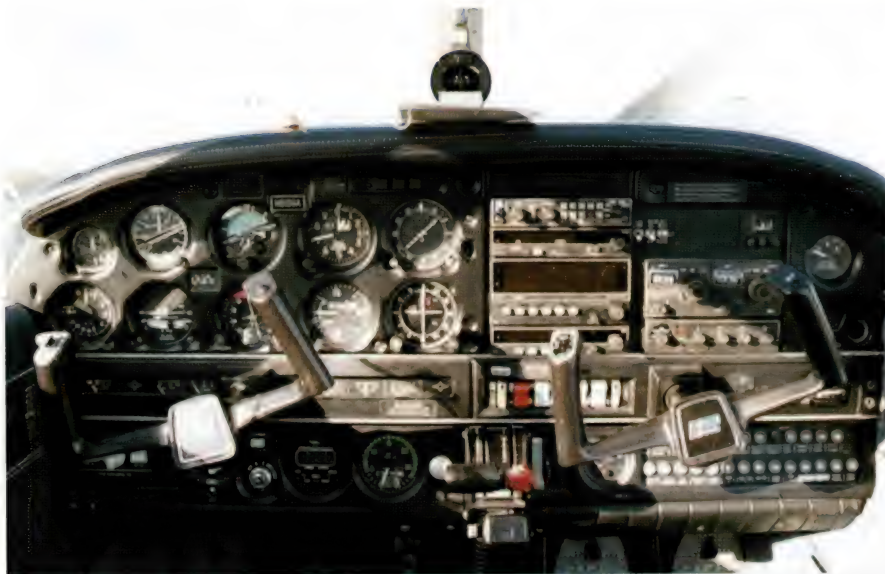


Photo of real panel in Piper Archer N8150A (top); Screenshot of freeware Arrow/Archer panel I modified for personal use (above).

- ❖ Performance maneuver (steep turns)
- ❖ Ground reference maneuvers
- ❖ Navigation
- ❖ Slow flight and stalls
- ❖ Basic instrument maneuvers
- ❖ Emergency operations
- ❖ Night operations
- ❖ Post flight procedures.

The acceptance criteria are provided in the booklet containing the practical test standards, so the candidate knows exactly what information and performance is required by the examiner in satisfaction of standard. In reviewing the PTS, I recalled that the instructor for my first lesson mentioned that over the course of student pilot training, there are over 1200 items of knowledge that would be learned. This includes the information that needs to be learned for the written test as well as the flying itself, though the PTS itself is contained in a small booklet with only 31 pages.

Preparing for Flight Test

I began my final preparations for the flight exam by working with my instructor to review information that might be covered on the oral portion of the flight test, as well as reviewing all required flight maneuvers. My instructor also referred me to a small booklet called Private Oral Exam Guide, published by Aviation Supplies and Academics, Inc., which provides a concise review for the oral exam. I also watched over five hours of video by King Schools that shows John King going through a mock flight exam with a real FAA-designated examiner. I found that watching this video gave me greater confidence than I previously had, because throughout the video I was able to say to myself, "I can do that," or "I know that."

Flight Test

After transition to the club's Piper Archers and a few weeks of practice, I was ready to take the flight test. Well, honestly, I wasn't sure I'd ever be truly ready, as I wanted to have a flawless flight test, but I felt confident enough to schedule the test and I needed to "get it done." I'd heard that some students procrastinate and continue to practice for months before taking the test. However, I also knew winter was fast approaching the Chicago area, so I scheduled the test for mid-October.

Federal Aviation Administration (FAA) designated examiners, who are FAA employees and are regular pilots approved to give flight tests for a fee, usually give them. I learned that my examiner has been giving flight tests for over 20 years, and that at one time he was the youngest examiner in Illinois. He lives near DeKalb, Illinois, so on

Getting Real

the day of the exam I would need to pick him up at DeKalb Taylor (DKB) airport.

I contacted the examiner to get his instructions for the test. I had learned from my instructor that much of the oral and flying portions of the exam focuses on the cross-country trip. After asking me the range of the Archer, he assigned me to prepare a cross-country trip from DeKalb to the airport at Kirksville, Missouri (IRK). He also reminded me to bring the aircraft's maintenance records to prove that I would fly the test in an airworthy aircraft.

Preparing for the Flight Test Cross-Country

In a continuing effort to take advantage of my flight simulator background, I practiced the entire cross-country flight plan from DeKalb to Kirksville in FS2000. You can see the photo of N8150A's real panel, compared to the freeware panel by Tommy Soderqvist, Michael Verlin, Jim Turner, Ray Pennington and Andre' Mostert, which I modified for personal use.

I changed this panel to add a Horizontal Situation Indicator instead of Heading Indicator, and I placed the ADF indicator in the upper right-hand location, in place of the original VOR1 display, since the VOR1 display function is incorporated into the HSI. The lower left gauge is a radar altimeter, in the position where the ADF is located on Archers without an HSI. I also changed radios and their arrangement. The open spot is for an RNAV radio that I was not able to find, and I needed to add a separate DME instrument, as that's part of the missing RNAV radio. The only other error in my customization is that I couldn't find the two-handle throttle quadrant, so I have to ignore the Prop control on the panel.

The simulator panel I modified for FS2000 is very realistic, with all functions of the real panel, including the HSI and radar altimeter. You'll see some other differences. N8150A has an RNAV unit, which I can't find in the simulator world, and the control levers include a prop control, though none exists in the real aircraft. Using the simulator panel, I refreshed my understanding of how an HSI works, including the feature that when tracking a VOR, there is no reverse-sensing of needle deflection that exists with a customary VOR gauge. You always fly *toward* the middle segment of yellow split bars to track toward the desired radial.

I used the FAA-contracted DUATS system on the Internet to lay out a flight plan from DeKalb to Kirksville with the following intermediate waypoints, which you can follow on a Chicago sectional or program with a flight planner:

>Kewanee airport (EZI) and related NDB

>Galesburg airport (GBG) and related VOR

>Burlington VOR (BRL)

>Keokuk airport (EOK) and related NDB.

Because there was a significant distance from DeKalb to Kewanee, I also laid out three visual checkpoints at the beginning of the plan. To enter these into the DUATS flight plan, I measured the radials and distance to these checkpoints from the Polo VOR. I continued using DUATS to get a weather briefing and file a VFR flight plan for the estimated departure time of my exam.

Aircraft and Personal Records

After flying to DeKalb and moving to a conference room where we would go through the oral exam, the examiner asked me to prove that we would be flying in a "legal" and airworthy aircraft. I demonstrated that the aircraft was legal by showing that it had a current annual inspection, that the pitot-static system had been checked within two years. Also, that the altitude-encoding transponder had been checked within two years, and that the Emergency Locator Transmitter (ELT) had been serviced with a new battery within one year. I demonstrated that I was personally "legal" to fly by showing my medical certificate and matching photo identification. The back of my medical certificate was my student pilot certificate, with appropriate solo endorsements for the C172 and PA-28-181. Simultaneously, I needed to hand over the report of my written exam, and lastly, provide a check for the examiner's fee.

Oral Exam

After proving that both the aircraft and myself were legal for the exam, we stayed in the conference room for another hour to work through the oral exam. The examiner's questions were focused on talking about my cross-country flight plan, aircraft performance characteristics pertaining to the flight, and general knowledge of airspace requirements.

The examiner was not confrontational, and to some extent, it was instructional. Given that he has been giving these exams for over 20 years, I'm sure he has a set of favorite questions and answers that clarify the knowledge of typical student pilots. The questions about airspace requirements pertained to visibility and clearances from clouds for class B, C, D, E, and G airspace, along with sub-categories based on altitude and underlying ground elevation. For example, the requirement at large airports, which comprise Class B

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(controlled) airspace are “three statute miles” and “clear of clouds.” In comparison, the requirement for Class G (uncontrolled) airspace when under 1200 feet AGL, is “one statute mile” and “clear of clouds” for daytime, but for night (with exceptions), “three statute miles” and “500 feet below, 1,000 feet above, and 2000 feet horizontally from clouds.”

The entire list of requirements is difficult to memorize, and fortunately, the chart of requirements is often printed on a checklist and carried on kneeboards. After completing the oral exam, we headed out to the aircraft.

Flight Test - Highlights

We began the flight test by my performing a preflight inspection of the aircraft. I was surprised that the examiner paid very little attention to this, though I had previously flown the airplane from DuPage to DeKalb.

After starting the airplane and taxiing to the active runway at this controlled airport, the examiner requested that I perform a short-field takeoff. In the Archer, this maneuver requires setting two notches (25°) of flaps, holding the brakes while moving the throttle to full power, then releasing the brakes and rotating the aircraft promptly at 55 knots, and then setting best angle of climb. Best angle of climb in the Archer is achieved by controlling the pitch attitude to achieve 66 knots indicated airspeed.

After completing the short field takeoff and reaching cruise altitude, I turned toward the first leg of the planned cross-country trip. I began to demonstrate navigation by a combination of pilotage, dead reckoning, and radio navigation. After reaching my first visual checkpoint, the examiner stated that the weather at our planned destination was unacceptable and that we would need to divert to an alternate airport; namely, Clinton, Iowa. He then asked me to use the sectional chart and plotter, as well as mental arithmetic, to calculate the distance, time, and fuel usage, to get to the new destination. This was difficult, because I had never practiced it, and I had to do this while continuing to fly the plane and try to hold altitude within 100 feet in bumpy air.

Next, I was asked to track radials for two different VORs — one inbound and one outbound, which was fairly simple, though it was still bumpy and I needed to hold altitude within 100 feet while watching the omnibearing display. Next came steep turns, and as I experienced during my training, this was difficult, but I managed to stay within the required 100 feet while holding a 45° bank for both left and right 360° turns.

Recovering from “unusual attitudes” was the next event, and this task is done “under the hood.” With the hood on and my eyes closed, the examiner placed the aircraft in first one, then a second unusual attitude. In both cases, after opening my eyes and looking at the gauges, I needed to recover to straight and level flight. The second one of these was made more difficult because the examiner added the comment, “if I do this right, you’ll feel like you’re upside down.” Well, I didn’t feel like I was upside down, but I did get a bit nauseous, and the feeling was still with me even after we landed.

Next came execution of two reference maneuvers, and this included both turns around a point and turns across a road. I had mastered these maneuvers before, but these were difficult to do, because I was still somewhat nauseous.

Finally, the examiner told me to fly back to DeKalb and perform a short-field landing, with the presumption of a 50-foot obstacle on the threshold of the landing runway. Again, my lessons had included the basic short-field landing technique, but having the obstacle on the threshold was new. Anyway, it was “now or never,” so I flew over the threshold about 70 feet above the runway, then performed a steep full-flaps descent to land with runway to spare.

After a hard landing, I taxied back to the DeKalb FBO, not knowing for sure whether I passed. Fortunately, however, the examiner turned off the engine, shook my hand and said, “congratulations.” I did it! And after getting out of the aircraft, he signed a temporary certificate and I flew back to DuPage.

How Flight Simulation Experience Helped

As a final reflection on the process of my “getting real,” here are some thoughts about how ten years of flight simulation experience helped my getting a Private Pilot certificate.

Getting Real

Aircraft controls

Though I'd used a joystick for most of my flight simulation, I'd also used rudder pedals, and using a real yoke and pedals was a simple transition.

Flight planning and navigation

My simulation work paid off here, as I'd been using charts and navigating with VORs for many years, though I needed to learn more about using NDBs.

Communications

Because of my experience with ATC in Flight Unlimited, FLY! and with SquawkBox for flying online with SATCO, I was much more familiar with communications than I would have been otherwise.

Flying by instruments

Though only three hours of instrument time is required for private pilot training, this was pretty easy for me, as it's what I'd done most of the time with flight simulation. Still, it was a challenge to "divorce" what I felt in the "seat of the pants" from what I saw on the instruments. The key to instrument flying is to ignore the physical feelings and focus exclusively on the instruments.

Preparation for written test

Flight simulation helped here, as I had good knowledge of several topics, including how airplanes fly, how to navigate, and using all aircraft instruments. As an example, when needed to answer test questions about the HSI, and what various displays on it mean, I already understood this complex instrument.

Takeoffs

Certainly, I'd performed hundreds or even thousands of takeoffs in simulation, but the real experience is humbling. This is particularly relating to holding the runway centerline during takeoffs, using the rudder to compensate for left-turning tendencies, how to take off and land with a significant crosswind, and how to "stay coordinated," with proper use of rudder.

Landing Pattern

Though I understood the principles of a rectangular landing pattern from some Navy training and right-seat flying with friends, it's difficult to simulate because of visual cues that must be used.

Landings

After thousands of flight simulator landings, I was surprised how difficult it was for me to learn the sensitivity of controls necessary for proper flaring during landing. Again, to my surprise, it took longer for me to solo than called for in the syllabus, though as I pointed out in Part 2 of this series, I had some misinstruction.

Vision

I needed to learn to "keep an eye on the sky" – for other aircraft or obstacles. With flight simulation, I'd spent too many years staring at panels on my computer monitor.

Reference Maneuvers

I needed to learn to execute "turns around a point," "S-turns across a road," and "turns in a rectangular pattern," including compensating for wind. These maneuvers are very difficult to simulate because of the need to focus on a variety of visual references.

Steep Turns

Though flight simulation can aid understanding the aerodynamic factors involved in doing 360° turns with a 45° bank angle, performing these turns in a real aircraft is a significant challenge.

Considering all factors, I'm sure that I knew more than the average student pilot did, particularly at the beginning of my training. Also, I already knew the vocabulary of flying. And despite some lack of realism, I was very glad to be able to practice all flight maneuvers with flight simulation. Most importantly, I know my comfort level was significantly greater; therefore, any stress involved in "getting real" was minimal.

Last Words

What's more to say? If you've ever thought about taking flying lessons, after learning about aviation from computer flight simulation, I urge you to "go do it." I did all this at age 58 and wish I'd done it sooner. And as I work through my Instrument Rating, I'm still very excited about "getting real" with aviation. By the way, flight simulation has been an important factor in my understanding of the knowledge and procedures required for the Instrument training - more about that in the next issue.

Roadable Aircraft VTOL & Flying Cars

“Mark my word: A combination airplane and motor car is coming. You may smile. But it will come...”
Henry Ford 1940

Airplanes and automobiles have arguable changed how and where we live more than any other invention. Airplanes have cut travel time to distant areas to a few hours instead of days and affordable automobiles allow us to live farther away from cities and our jobs. Of course, our fascination with the automobile is part of the reason for traffic congestion, which means you've probably also been stuck with countless other drivers in a "slow moving parking lot" on the road.

Although it's easy to think that traffic congestion is a big city problem, the Road Information Program (TRIP) in Washington D.C., says that traffic congestion is increasing throughout the country. In one report (August 1999), the Texas Transportation Institute (TTI) says that the amount of time commuters in small- and medium-sized towns are spending in traffic has more than quadrupled since 1982. TTI also reports that traffic congestion now costs drivers

in the nation's 70 largest urban areas over \$74 billion a year in wasted time and fuel (<http://www.tripnet.org/>).

One solution to someday making traffic jams a bad 20th century memory is by creating and using a form of transportation that won't always need roads. All you would do is push a button on the dashboard so your car becomes airborne and you fly over the traffic problems. In other words, the answer is *roadable aircraft*, or what we used to call *flying cars*.

Although aviation experts have for the most part put the flying car in the oddity hangar, we've recently heard talk again of serious development into roadable aircraft. You're probably familiar with George Jetson's flying car and have heard promises about flying cars before, but what is different now is that the technology to make them safe and easy to fly may finally be here.

In this issue of *Flight Simulator World*, we'll look at the history of roadable aircraft and consider what might be parked in your garage in the next ten years.

You're probably familiar with George Jetson's flying car and have heard promises about flying cars before, but what is different now is that the technology to make them safe and easy to fly may finally be here.

By Scott Slaughter

Roadable Aircraft, VTOL & Flying Cars

Marketing Challenge

Arguably the biggest challenge isn't building a roadable aircraft, but is in selling it. This is because there are many technical challenges in building and selling a vehicle worthy of both land and air. A car and airplane have some elements in common, such as:

- ❖ Fuel tank
- ❖ Steering wheel
- ❖ Passenger(s)
- ❖ Baggage compartments
- ❖ Wheels
- ❖ Engine

However, you obviously need more for flight than what you usually find on cars:

- ❖ Ailerons
- ❖ Elevators
- ❖ Horizontal stabilizer
- ❖ Propeller
- ❖ Rudder
- ❖ Vertical tail
- ❖ Wings

Then to drive on the road, you need elements that are useless in flight:

- ❖ Bumpers
- ❖ Catalytic converters
- ❖ Drive train
- ❖ Mirrors

All this of course doesn't include receiving certification from government agencies such as the FAA and NHTSA.

You probably won't be too surprised to learn that adventurers were already thinking about flying cars early in the history of both vehicles. Only fourteen years after the Wright Brothers first flew and nine years after Henry Ford introduced the Model T, visitors to the Pan American Aeronautic Exposition in New York City (1917) were the first to see a vehicle built by the Curtiss Aeroplane and Motor Company called the Autoplane. It was a three-seat car design (the pilot/chauffeur sat in the front seat which gave it the nickname *Flying Limousine*). It featured triplane wings that spanned forty feet. Although it flew, it never did well enough to gain serious interest.

It was 1937 before airplane designer Waldo Waterman revived interest in a flying car with his Arrowbile. It was a refinement of his earlier attempt called the Arrowplane. Its three-wheel design was adequate for short drives to the airport but it fared worse on the open road. It was said to be nearly stall-proof and impossible to spin when airborne.

The years following World War II, perhaps the golden age of flying cars, saw the introduction of Molt Taylor's Aerocar, Robert Fulton's Airphibian (1946) and the ConVairCar (1947). The Airphibian drove well enough to negotiate city traffic. Its unusual approach to the flying car idea was that it topped a two-door sedan with a flight unit containing its own powerplant, which car owners would rent at the airport. Unfortunately, production plans ended for the ConVairCar when it crashed on its third flight (even more unfortunate for the project because the crash wasn't due to technical problems but pilot error; it ran out of fuel because the pilot was watching the fuel gauge for the automobile instead of the fuel gauge for the aircraft).

Leland Bryan produced several highway-certified folding-wing Roadables in the 1950s and 1960s that used pusher propellers for both air and road power. Bryan died in the crash of his Roadable III in 1974. Henry Smolinski also used the ConVairCar rental unit idea in 1973 by attaching the wings, tail and aft engine of a Cessna Skymaster to a Ford Pinto. Sadly, the wing struts collapsed on its first test flight and both Smolinski and the pilot were killed.

Although these early pioneers suffered setbacks, or worse, in their hopes of developing a viable flying car, they did prove that a car could be built to fly. This has inspired a new group of roadable aircraft enthusiasts. Thanks to advances in lightweight material and computers for both designing and flying the aircraft, the dream is very close to becoming reality. However, some obstacles remain — not the least of which is approval from the FAA and the National Highway Traffic Safety Administration (NHTSA) — but some cars are inching closer to completion.

Roadable Aircraft, VTOL & Flying Cars

Current Developments

These are a few of the engineers taking on the challenge of designing a new breed of flying cars.

Moulton Taylor

Many enthusiasts consider Moulton "Molt" Taylor of Longview, Texas to be the dean of the flying car. He has worked on an Aerocar IV that uses a Geo Metro auto for the car portion and a second engine for flight. (He received a speeding ticket in Florida while driving an Aerocar to an auto show.)

Molt Taylor became the first person to send a surface-to-surface missile successfully to its target in 1942. He headed the project the following year that produced an early generation of cruise missiles. His resume also includes homebuilt aircraft like the Coot, an amphibious "floatwing" plane, and the Imp and Mini-Imp, two versions of a sportplane. An early version of an Imp began his interest in flying cars. He was looking for a building in New Castle, Delaware in 1946 where he could build an amphibious sportplane he was then calling the Duckling, that he met fellow enthusiast Robert E. Fulton, Jr.

Taylor like Fulton's idea of a winged automobile but considered the need to drive without the flight components took away from the independence of a flying car. Instead, his design put the wings, tail and propeller conveniently into a trailer that the user could tow behind the car. To keep the Aerocar's weight low, Taylor had the revolutionary idea of using fiberglass for the car's outer panels (an idea that General Motors used years later on the Corvette). Another revolutionary idea for the time as that the Aerocar used front wheel drive because the rear wheels were used for landing.



Check the official website for more information on the Aerocar (<http://www.aone.com/~gford/aero.html>).

Aerocar Incorporated developed one prototype and four more examples of the design, today called Aerocar I. A radio station in Portland (KISN) bought an Aerocar in 1961 to help in traffic reporting. Taylor was also able to get a financial deal with Ling-Temco-Vought in Dallas. They would build 1,000 Aerocars for about \$8,500 each if Taylor could guarantee 500 orders. Although he was able to get nearly 300 orders within two weeks, he unfortunately fell short of the 500 demanded by Ling-Temco-Vought and the deal ended.

Ford Motor Company took an interest in Taylor's Aerocar III in 1970. The Aerocar III had fully retractable wheels that cut drag and increased cruise speed 10 percent to nearly 120 mph. Ford's interest in the Aerocar, however, ended with the oil crisis and increased number of cars imported from Japan.

Paul Moller

Paul Moller has spent most of his life and several million dollars developing the Skycar. He is now very close to developing the first mass-marketed flying car. In 1965, he demonstrated his first attempt, the XM-2, which managed to hover successfully but did not fly. In 1989, Moller unveiled the M200X, which has now flown 200 flights and can go as high as 50 feet (15.24 meters).

Moller's latest design is the Skycar M400. It's different from most other roadable aircraft because it's designed to take off and land vertically, like a Harrier Jet. Its top speed of 400 mph is also impressive, but will cruise at around 350 mph with a range of 900 miles. Owners will be able to use gasoline, diesel, alcohol, kerosene and propane to power the Skycar. Don't consider the Skycar if you suffer from sticker shock; its initial cost will be about \$1 million, but once it begins to be mass produced that price could come down to as low as \$60,000.

The four-seat Skycar is powered by eight Wankel rotary engines that are located inside four metal housings on the side of the vehicle. The reason for eight engines is for safety; in case one engine fails, the other engines can maintain flight. The 720 horsepower engines lift the Skycar before thrusting it forward.

Short History Of Roadable Aircraft

It wasn't long after the Wright Brothers first took off in their airplane in Kitty Hawk, N.C., in 1903, that other dreamers began chasing the idea of a flying car. (Although some true visionary in the 18th century tried to develop a gliding horse cart, unfortunately, it failed.).

The United States Patent and Trademark Office has almost 80 patents on file for different types of flying cars. Although most have failed to fly, all have come up short of reaching the goal of the mass-produced flying car – so far. Here's a look back at a few of the flying cars that distinguished themselves from the pack:

Curtiss Autoplane

Glenn Curtiss, who could be called the father of the flying car, unveiled the first attempt at a flying car in 1917 at the Pan-American Aeronautical Exposition in New York City. His Autoplane was an aluminum triplane with a wingspan of 40 feet. The car's motor drove a four-bladed propeller at the rear of the car. It was designed as an air-limo and came complete with a velvet-and-leather interior. Although it never truly flew, the Autoplane did manage a few short hops. It was shelved when World War I turned Curtiss' attention to less fanciful projects.

Pitcairn AC-35

In 1935, the Experimental Development Section of the Bureau of Air Commerce (headed by Eugene Vidal - Gore Vidal's father) sponsored a contest for roadworthy planes. They awarded a contract for the development of an advanced version of the PA-22, a small cabin autogiro built by the Pitcairn Autogiro Company.

The AC-35 included many features that the developers hoped would appeal to the public. For example, the owner could fold the rotor blades back over the fuselage when traveling on the ground, disengage the propeller and put the tailwheel in gear. The front wheels were used for steering. Also, the owner could store the AC-35 in their garage with room to spare.

The aircraft could reach a maximum speed of 25 mph on the road. It seated two in a side-by-side arrangement and had hand baggage storage space behind the seats. The 90-hp engine was mounted behind the cabin.

Besides its use by the public as a pleasure craft, the developers saw other possibilities for the AC-35. These possibilities included military and commercial transportation, aerial surveillance and photography and police patrol.

On October 2, 1936, James G. Ray, vice president and chief pilot of the Autogiro Company of America, landed the AC-35 in a small downtown park in Washington, D.C. He converted the aircraft to its roadable configuration and drove it to the main entrance of the Commerce Building, where he met John H. Geisse, chief of the Aeronautics Branch. The AC-35 was taken to the department's hangar at Bolling Field and further test flights were made. It was also displayed publicly at air shows and other events.

In 1961 Skyway Engineering Company, Inc. (Carmel, Indiana) signed a contract with the Autogiro Company of America to obtain exclusive design rights, patent rights and more in order to again produce AC-35s. Skyway planned to sell the aircraft for between \$10,000 and \$15,000 each. One model was built and successfully test flown at Terry Field near Indianapolis in the mid-1960s. However, the company was dissolved a short time later and no additional AC-35s were built.

Arrowbile

Waldo Waterman developed the Arrowbile in 1937. It was a combination of Studebaker automobile and airplane. It also featured a propeller attached to the rear of the vehicle just like the Autoplane and the wings detached for easy storage. A 100-horsepower Studebaker engine supplied the power for the three-wheeled, two-passenger car. As with all the other projects, the project was stopped for a lack of funding.

The aircraft picked up the nickname *Whatsit* from curious onlookers at the Los Angeles Metropolitan Airport. Waldo spent several days taxiing around the field, getting the feel of the airplane. Then he began moving straight down the runway taxi and giving the *Whatsit* full throttle. However, just as he was about to take off, the front wheel fell into a gopher hole. Despite this inauspicious performance and some damage (the doors flew off their hinges), the *Whatsit* did sail through the air for about thirty feet, arguable a good indication of its flight characteristics.

After making the necessary repairs, Waldo started his takeoff again and this time was able to take off successfully. However, a quick and unexpected descent put him right back down on the runway. Only the sturdy tricycle landing gear prevented serious damage to the airplane. After further testing, Waldo moved to the long concrete runways at United Airport. He headed down the long runway and was soon in the air.

He later moved his project to the remote Rosamond Lake area of interior California. This not only gave him more room but also more privacy. He soon had the "Whatsit" flying the way he felt it should.

He flew it back to United Airport and entered Eugene Vidal's competition for an "Everyman's Airplane" which was announced by the Department of Commerce. He was given an order to build a prototype for government evaluation and this gave birth to the Waterman Arrowbile.

Airphibian

Robert Fulton, who was a distant relative of the steam engine inventor, developed the Airphibian in 1946. Instead of adapting a car for flying, he went the other way and adapted a plane for the road. His idea was for owner to remove the wings and tail section of the plane for road travel.

Also, the owner could remove and store the propeller inside the airplane's fuselage. Although it sounded complicated, the process of converting the plane into a car took only five minutes.

The Airphibian was the first flying car to be certified by the Civil Aeronautics Administration, the predecessor of the the Federal Aviation Administration (FAA). It had a 150-horsepower, six-cylinder engine and could fly 120 miles per hour and drive at 50 mph. Despite the technical successes, Fulton couldn't find a reliable financial backer for the Airphibian.

ConvAirCar

In the 1940s, Consolidated-Vultee developed a two-door sedan that included a detachable airplane unit. The ConvAirCar made its debut in 1947. It could fly up to one hour and had a gas mileage of what is today an impressive 45 miles per gallon. Unfortunately, all plans and hopes to market the car ended when it crashed on its third flight.

Avrocar

The Avrocar was the first flying car designed for military use. The flying-saucer-like vehicle, developed in a jointly for the Canadian and British military, was designed to be a lightweight air carrier that would move troops to the battlefield.

Aerocar

Moulton "Molt" Taylor, inspired by the Airphibian and Robert Fulton, whom he had met years before, created the Aerocar, perhaps the most recognized and most successful flying car to date. The Aerocar was designed to drive, fly and then drive again without interruption. It was covered with a fiberglass shell. A ten foot long drive shaft connected the engine to a pusher propeller. It cruised at 120 mph in the air and was the second and last roadable aircraft to receive FAA approval. In 1970, Ford Motor Company considered marketing the vehicle, but the plans ended because of the oil crisis and Japanese imports.

Antonov KT

The Antonov KT (Kr'lya Tanka, also called the A-40 or A-T) was developed in 1940. It was a Russian attempt to deliver an air-towed light tank fitted with biplane glider wings.

The "fuselage" of the unit was a T-60 light tank and its unlocked tracks served as the "landing gear." A biplane wing of plywood and fabric was attached, together with a pair of tail booms with twin vertical surfaces and a high-mounted single horizontal surface. A single lever controlled all flying surfaces from the driver's position. The flying surfaces were to be jettisoned directly on landing.

The Antonov KT had no power for flight but was instead towed by a heavy bomber. Some dispute exists on whether the KT ever left the ground but even Soviet sources say only one flight was successful. Because it had only limited official support, the program was never seriously pursued.

Hafner Flying Jeep

The Hafner Flying Jeep, also called a Rotabuggy, was a towed flying Jeep that was kept aloft by an autogyro-type rotor. It basically was a test to deliver air-towed tanks, similar to the Antonov KT. However, development of Horsa II and Hamilcar vehicle carrying gliders made further development of the idea unnecessary.

Roadable Aircraft, VTOL & Flying Cars



For more information on the Skycar, check the Moller International website (www.moller.com/).

To make the Skycar safer and available to the general public, it will be controlled by computers using Global Positioning System (GPS) satellites. An additional safety feature in case of an accident is that the vehicle will release a parachute and both internal and external airbags to cushion the impact of the crash.

Rafi Yoeli of AD&D Ltd.

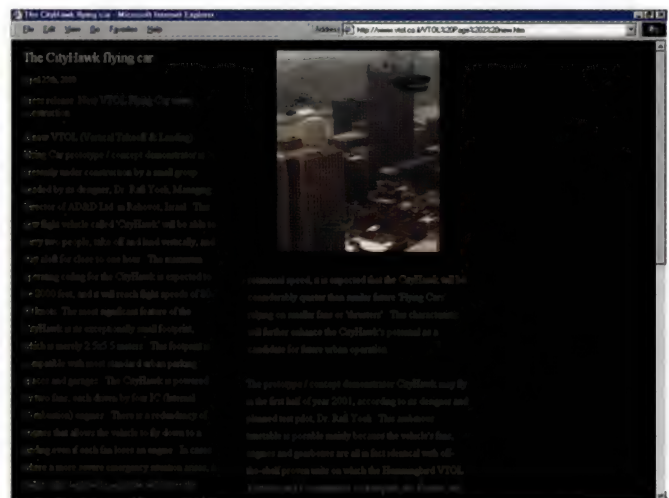
AD&D Ltd. in Israel, headed by Rafi Yoeli, is developing the CityHawk. He plans to test the CityHawk, which is about the size of a large SUV, this year. It is similar to the Skycar in many ways. For example, the CityHawk also takes off and lands vertically. Four internal combustion engines drive fans that will power the CityHawk. This redundancy of engines will allow the vehicle to land even if one of the engines is lost. Also in case of a severe emergency, the CityHawk deploys a parachute to lower the entire vehicle (and occupants) safely to the ground.

The maximum operating ceiling for the CityHawk is expected to be 8000 feet and flight speeds of up to 90 knots. Since it's designed to stay aloft for close to one hour, CityHawk developers say that it could be used as an air taxi, for news reporting and for traffic control.

AD&D is hoping that because the SkyHawk is designed to stay aloft for up to an hour, it could be used for an air taxi, news reporting, traffic control, police patrol and even be produced in special configurations for ambulance and urban evacuation missions. In other words, the CityHawk could be used for operating in areas where the large and exposed rotors of a helicopter give them limited accessibility. For example, operating close to buildings won't be a problem for the CityHawk - it will be able to rescue trapped people inside high rise buildings by hovering close to a window and allowing a person to step

on to the platform (with one of the canopies removed) and then flown to the ground down to safety.

The CityHawk will be considerably quieter because of its fans relatively low blade loading and rotational speed compared to similar roadable aircraft that rely on smaller fans or thrusters. This characteristic will further enhance the CityHawk's potential as a candidate for future urban operation. The prototype / concept demonstrator CityHawk is scheduled to fly this year.



For more information check their website:
<http://www.vtol.co.il/VTOL%20Page%202%20new.htm>

Branko Sahr

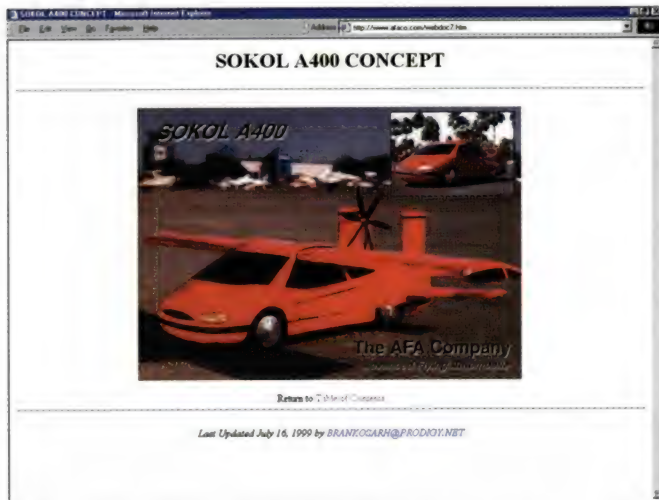
Branko Sahr, a senior engineer at McDonnell Douglas Aerospace (Long Beach, California), recent attempt of a roadable aircraft is called the Sokol 400. Sahr designed a 4-passenger vehicle that would pop out telescoping wings at the push of a button.

Sahr was sketching flying car designs as a teenager in Germany before studying aircraft and automotive design in college. He began concentrating on composites and automation at the Massachusetts Institute of Technology in the early 1980s - two important elements of his futuristic Advanced Flying Automobile.

His four-passenger AFA, designed with the help of Merkel Weiss, an automotive engineer who teaches at the Art Center College of Design in Pasadena, California, appears both sleek and stylish and boasts front and rear seat airbags, air conditioning and a shifting diagram of P to R to N to D to F. The car becomes flight-ready in seconds at the push of a button. Then front wings telescope from the sides of the roof; rear stabilizers do likewise from the sides of the car behind the rear wheels and a pusher prop rises up from the trunk. Sahr therefore envisions a combination of comfortable private airplane with a high-performance automobile with the snob appeal to attract

Roadable Aircraft, VTOL & Flying Cars

buyers. He figures 1,000 or so orders annually at \$200,000 each would cover initial production costs. Some 10,000 orders per year would cut the cost to \$120,000.



For more information check their website:
<http://www.vtol.co.il/VTOL%20Page%202%20new.htm>

Nevertheless, Sarh remains optimistic on everything about the Advanced Flying Automobile except locating the money to fund it. He realizes building a prototype of his AFA would be a multimillion-dollar venture, and that doesn't include the millions needed to certify the vehicle for the highway and flight. He's looking for a benefactor if you have enough spare cash lying around your house.

Kenneth Wernicke

Kenneth Wernicke has some impressive credentials in his resume. He worked for 35 years at Bell Helicopter Textron (where he was known as "Mr. Tiltrotor"). Wernicke was lead engineer on the XV-15 and director of the V-22 Osprey Tiltrotor. He formed Sky Technologies in Hurst, Texas in 1990 to develop a small-winged flying car. His Aircar has flown between 200 and 400 mph and driven at 65 mph. It's also small enough to fit into a typical parking space.

"If it weren't for us nuts, you'd still be reading from candlelight and wearing button shoes."

Moulton Taylor

Instead of using a car-to-airplane or airplane-to-car transformations, Wernicke's design uses low-aspect-ratio wings that are wider than they are long. The winglets on the end of the wings boost aerodynamic efficiency and make the Aircar about as wide as a bus. Wind tunnel tests and flights with radio-controlled models have suggested this to be a viable design. Furthermore, he has created interest in the design by driving in a mockup that's eight and a half feet wide and easily maneuvering it into standard parking spaces.

A lack of funding has unfortunately also stalled Wernicke's hope for the Aircar. He believes that \$3 million is required to build two concept vehicles that are needed for flight testing and certification.

Roger Williamson

If Sarh's and Wernicke's ideas represent the high end, Roger Williamson's design may be a more practical approach to roadable aircraft. Williamson is a retired Air Force fighter pilot who works in his garage in San Antonio. He believes a kit-built design like his low-wing Roadrunner is a more practical approach to making the flying car a reality.

The projected cost of the kit-built is about \$25,000. Williamson, who has built four three-wheel cars, also believes that meeting highway safety standards will be easier for his three-wheel roadable aircraft if it's classified as a motorcycle.

Ed Sweeney

Ed Sweeney is a student of Molt Taylor student who has, in a sense, picked up the Aerocar torch. Sweeney made the original Aerocar airworthy again and took it to airshows. His flights included those for a Japanese film crew and from his home in Spruce Creek, Florida to Miami.

He's also working on another roadable aircraft. Sweeney is calling his design Aerocar V in tribute to Molt Taylor. He's using a Geo Metro convertible to help in connecting the wing, tail section and flight components.

He also plans to give customers the option of cutting the weight of the Aerocar V by substituting composite panels and possibly a second engine in the attachable airplane section and an inverted V tail.

Sweeney believes in the 1947 ConVairCar idea of airport-available airplane attachments. For example, companies may be renting attachable airplane portions at airports.

Sweeney has spent many hours modeling designs, performing calculations and creating and flying scale models. His next step is to build and test flight a full-scale prototype.

Roadable Aircraft, VTOL & Flying Cars

Conclusion

Having roadable aircraft available to the average person might be either very exciting or very scary, depending on your viewpoint. The average person has to overcome several barriers before using a roadable aircraft. One major barrier is the FAA, which isn't likely to grant airspace to thousands of roadable aircraft—congestion in the air is already bad. Another major barrier is an engineering problem. Roadable aircraft have typically been overpowered as cars but underpowered as airplanes. Also your insurance agent may shock you with the insurance premium, which is likely to be quite expensive.

Nevertheless, if proper safeguards are enforced and followed, roadable aircraft could be the answer to our increasing worsening traffic jams and deteriorating highway infrastructure. Roadable aircraft traveling hundreds of miles per hour not only would cut rush hour commute to a few minutes, but also let us live perhaps hundreds of miles from work and still make it in time to punch the timeclock. Furthermore, as long as *The Jetsons* keeps running on the Cartoon Network, the dream of a flying car will undoubtedly live on.

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Round Robin Adventure

Commuter Flight In Montana

This Round Robin adventure takes place in Montana. Flying for a Regional Airline, we're on a routine daily commute between four cities in Montana. This flight takes place in very mountainous areas and involves flying a couple of hard approaches and departures. Our plane is a twin turbo. I flew a Dash 8, but there are many suitable aircraft available at the regular flight sim web sites. You can find one the one I used at in the full throttle directory on my web site listed at the end of the article.

Al Pelletier



The Dash 8 over a snow covered Montana

Round Robin route:

In this Round Robin adventure, we're on a routine daily commute flying for a regional airline between four cities in Montana ("Big Sky Country"). This flight takes place in very mountainous areas and involves flying a couple of hard approaches and departures. Our plane is a twin turbo, such as a Dash 8.

Great Falls International (KGTF)
to
Helena Regional (KHLN)
to
Butte Mooney Airport (KBTM)
to
Billings Logan International (KBIL)
and back to
Great Falls (KGTF)

Round Robin Adventure

Round Robins

If you've flown previous Round Robins, skip this sidebar, jump right in and have fun. For the experienced flyers, please be patient through all of the explanations, directions and extras. I direct this at newcomers to the flying world. I must stick to plain language.

For those who are new to this, Round Robins are published with the intent of having Flight-Simmers fly, look at the scenery, refresh our geography, practice our cross country navigation, do some approaches at different airports all over the world, and have some FUN.

In the message, you will be getting info like: airport departure and runway numbers, VOR and ADF frequencies enroute, two or three middle airport destinations, and instructions for either VFR or instrument approaches. Then back to your point of departure (Round Robin). You will also be given ILS and LOM frequencies, visibility minimums, procedures etc. You will get info on the scenery needed to complete the flight and where to get it. Also, who created the scenery (for non-commercial) and a little background on the geography of the area. After you do a few of these, you will have a much better command and understanding of the different types of published procedures. You will learn to handle a lot of information in a very short time, while still maintaining control of your aircraft.

May I suggest, that you READ the route a couple of times before starting out, so that you'll have the flight plan fairly clear in your mind. Especially in a fast medium jet, there isn't much time to spare and definitely no room for errors. Remember this rule: "Never let an aircraft take you somewhere your brain didn't get to five minutes earlier".

Note that for the purpose of this adventure, we will pretend that we are getting Radar vectors to different VORs or ILS interception points. In the "Real" world of today, aircraft usually get vectors to the interception points, to insure proper separation. I'm also assuming that you will have a good look at the Approach Plates for each segment. If they are not all published in the magazine, you can get them at my web site also. Check for address below.

Recommended Add-on Scenery Files

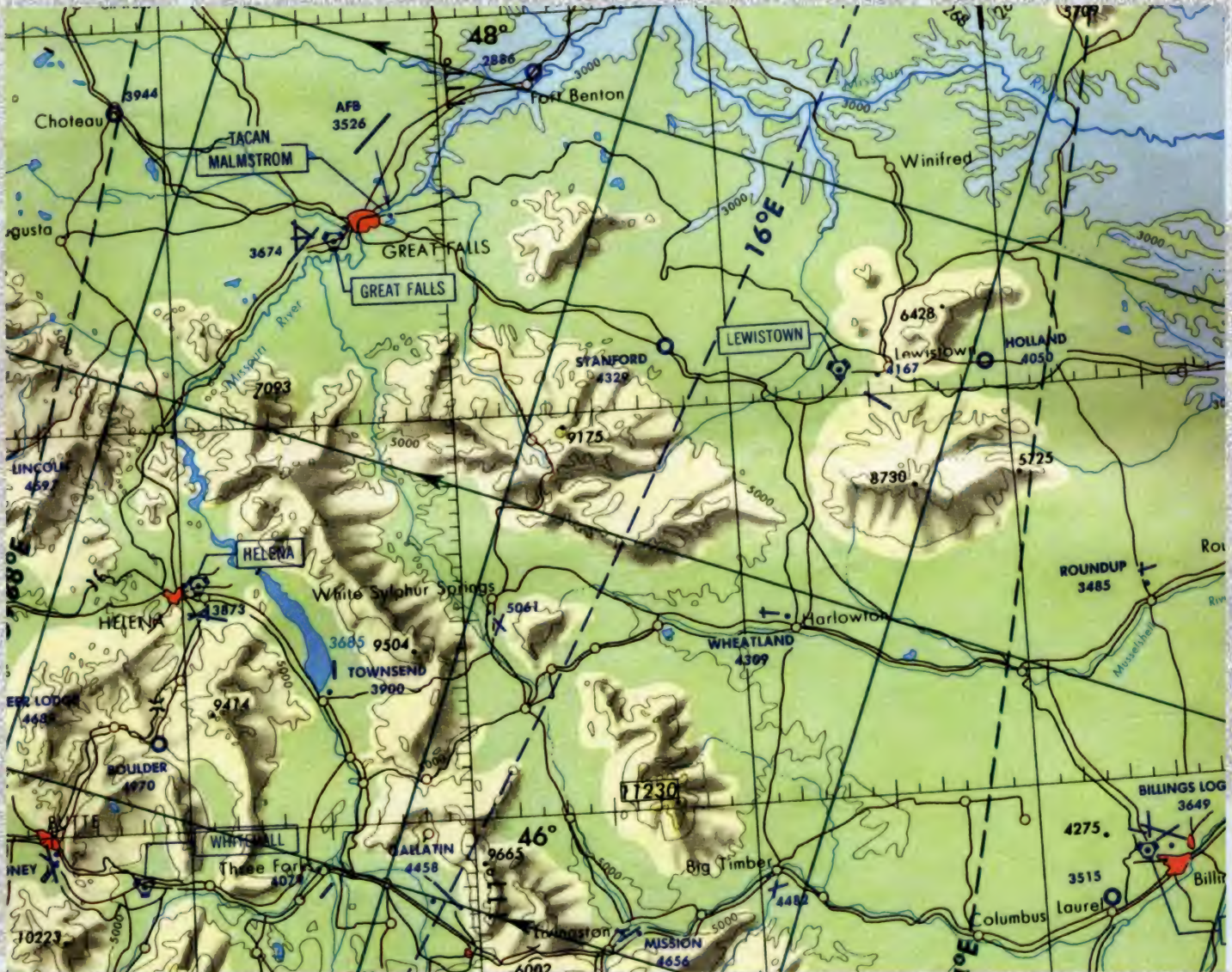
This Round Robin was created using the Microsoft default FS 2000 scenery. It can also be flown with any Simulators that have the required Nav aids and Airports.

First leg:

**Great Falls Montana (KGTF)
to
Helena Regional Montana (KHLN)
Approximately 76 nm**

- Set your clock to 08:00. Set the season to winter, and weather to 6,000 foot ceiling, overcast Stratus clouds 8/8, visibility 5 nm in light snow, wind from 290 degrees at 10 knots (You can also try this exercise with real world weather. It makes it very interesting).
- Select Great Falls runway 21 in the simulator.
- Dial in the TRULY (ITU) NDB at frequency 371, and the HELENA (HLN) VOR at frequency 117.70 on your NAV 1 radio.
- Takeoff making a left climbing turn to 11,500 feet, and home the TRULY NDB to on top.
- On top of ITU, turn right to heading 192 and track the HLN VOR.
- 17 nm before HLN turn left to heading 087 and descend to 10,000 feet. Fly a 15 nm arc off the HLN VOR, while continuing your descent to 8,100 feet. Have a good look at the approach plate. We are in a very mountainous area and there is no room for error. You can now also tune in the HAUSER (HAU) NDB at frequency 386, and the Localizer (I-HLN) at frequency 110.1 along course 267 on your NAV 1 OBS in preparation for an ILS approach to runway 27 at Helena. *NOTE: To fly the Arc. First, have a good look at the approach plate so that you visualize what you want to accomplish. In this case, you should keep the HELENA VOR on your right wing tip at 15 nm DME, and fly a circle (arc) until you can intercept the LOC. Keep an eye on your VOR and NDB needles. When they are pointing to 265 degrees, you know that you are about to intercept the LOC. I also like to save my flight at the beginning of the Arc so that I can practice this type of approach. This is what Flight Sim is all about!*
- When you reach the end of the arc you should be at 8,100 feet and your ILS will become active. Intercept the LOC and descend so that you will be at 6,800 feet over the NDB, and then proceed on the glide slope.
- 5 nm back you are cleared for landing with a full stop on runway 27 at HELENA. Check to make sure that your gear is down.
- Land and proceed to the terminal. Unload and pick up passengers and then carry on with the flight.

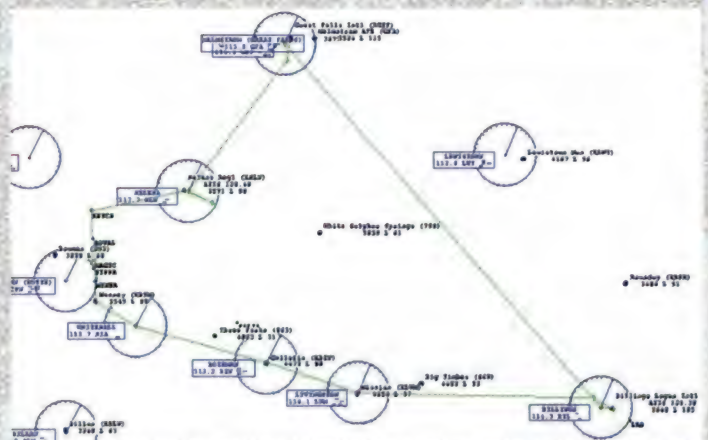
Commuter Flight In Montana



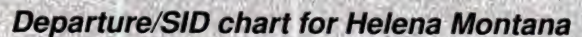
Second Leg:

Helena Regional (KHLN)
to
Butte Bert Mooney Airport (KBTM)
Approximately 65 nm

Our Round Robin route for this issue
(above and below).



- ✈ The weather is still the same, except the ceiling at Butte is 8,000 feet. Set your clock to 10:30 Local.
- ✈ Taxi to runway 27 for a HELENA TWO DEPARTURE. Because of the weather and the mountains around us, this is a set departure at this airport and it must be followed. See the SID chart included. Dial in the HELENA (HLN) VOR at frequency 117.7 on NAV 1, and set 318 on the OBS.

[illegible]

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Round Robin Adventure

Billings. 15nm out of BILLINGS turn left to heading 040, continuing your descent to 6,800 feet, and intercept the LOC.

- 5nm back you are cleared for landing with a full stop on runway 10L. Check to make sure that your gear is down.
- Land at Billings and taxi to the terminal to unload and load your passengers.

Fourth leg:

**Billings Logan Intl (KBIL)
back to
Great Falls (KGTF)
Approximately 155 nm**

- Set your clock to 18:30 local. Setting weather is optional (again, real weather is great at this point).
- Dial in the BILLINGS (BIL) VOR at frequency 114.50 on your NAV 1 radio, and set 297 on your OBS. Also, dial in the GREAT FALLS (GTF) VOR at frequency 115.10 on NAV 2.
- Taxi to and takeoff from runway 28R, making a right climbing turn to 17,000 feet. Establish on the 297 inbound radial of the BIL VOR until reception on the GREAT FALLS VOR. Once you have reception on GTF, you are cleared direct to Great Falls.

- Enroute to GTF, tune in the TRULY (ITU) NDB at frequency 371 in preparation for an NDB approach to runway 34 at Great Falls.
- 35 nm out of the GTF VOR descend to 11,000 feet.
- 20 nm out of the GTF VOR, continue your descent to 9,000 feet, turn left to heading 260 degrees and maintain until your ADF is pointing to 330 degrees. Then perform a right turn to overfly the NDB on a heading of 344 degrees.
- 12 nm out of the VOR you can descend to 5,800 feet in order to be at that altitude over the NDB. (Have a good look at the approach plate for safety altitudes around Great Falls).
- Over the NDB turn to heading 344 and you should have the runway in sight about 6.5nm back.
- 5nm back you are cleared for landing with a full stop on runway 34. Check to make sure that your gear is down.
- Land at Great Falls, taxi to the terminal and shut down.
Note: When taxiing to the terminal at Helena, you can see the Government capital building, as Helena is the Capital of Montana

Welcome home!

About the author.....

AI was born in Matane, Quebec in 1948. He served 25 years as aircrew in the Royal Canadian Airforce, in a non-pilot role. His job centered on RADAR, Forward Looking Infrared (FLIR) and radio communications. He has served over 6,000 hours in everything from the Canadair Argus, the Tracker, a Sea-King Helicopter, DC-3s and P-3s.

AI retired from the RCAF in 1990 and is now the owner of a computer retail store. His hobbies include fishing, gardening and, of course, flight simulation.

Additional Information

You will find the DASH 8 airplane and panel, along with high resolution scans of maps and charts for this article at the Full Throttle area of my web site at [http:// www.simwings.net](http://www.simwings.net)

Look for Montana.

Acknowledgments

Many thanks to Chris Squire for test flying the route. Chris is a retired military pilot with over 12,000 hours of flying.

As a reminder, the navigation charts are **not to be used for real world navigation.**

Cheers and keep on reading *Flight Simulator World*.



Scenery Design Corner

Creating Photorealistic Scenery For Microsoft Flight Simulator 2000

Having been a flight sim buff since the Atari and SubLogic days, I have taken a keen interest in the development of scenery for the various simulators over the years. Actually, I first heard of the existence of a desktop flight simulator in the early eighties, when my "power PC" was the Sinclair ZX-81. But I never actually installed one on my system at that time. Between that time and now I have owned many versions of the classic Microsoft Flight Simulator, and I cannot help but marvel at how far it has come over the years.

It wasn't until 1994, when I purchased Mallard's San Francisco Bay scenery for Flight Simulator 4, that I acquired a new appreciation for what would become my part time hobby. Somehow, creating and populating a scenery depicting reality as close as possible seemed very appealing to me, and the photorealistic approach was by far the best way of achieving this realism.

What is photorealism?

Pure and simple, *photorealism* depicts the scenery by rendering it using the photo imagery of the actual landscape. There is nothing fake, synthetic, or made up with this approach. It cuts no corners and shows it like it is.

Depending on the resolution and the quality of the imagery, every boulder, bush, creek, road and house that was present at the time the image was acquired will be visible in the scenery.

Rivers will follow the correct, natural pathways, vegetation will have that random dispersion look, and mountains will have erosion scars. This scenery does not come cheap, and I don't mean in monetary terms. All of these images are cut into photorealistic textures, in whatever format is required by the Flight Simulator display engine. Again, depending on the resolution of the imagery, a small (in aviation terms) chunk of scenery covering 65 x 65 km

By Misho Katulic

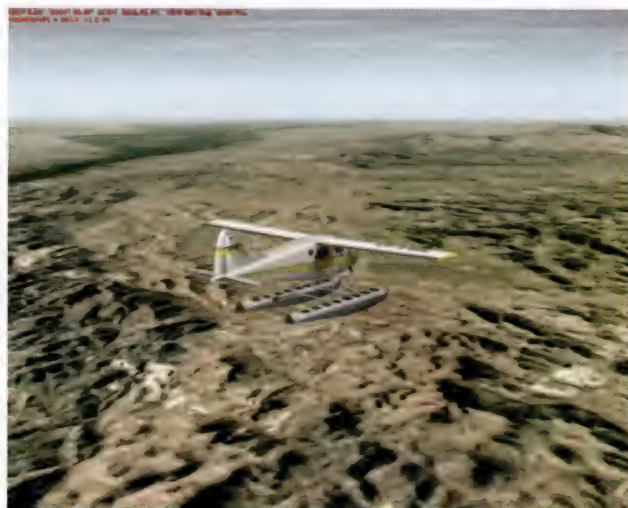
About the author:

Misho Katulic is the author of the TerraBuilder scenery design program. As a leading software developer in 3rd party scenery tools for Flight Simulator, he is providing us with some insight on how Flight Simulator 2000 scenery works, and how scenery artists can overcome some of the obstacles in creating photorealistic scenery.

Scenery Design Corner



(Left) Photorealistic area of Cape Canaveral, Florida. Every small bay, inlet and cove is realistically depicted in this high-resolution photo-realistic scenery for FS2000. The default scenery, which is covered by this scenery, has the coastline approximated by straight-line polygonal segments.



(Above) Desert scenery of Southern California/Arizona border area, being visited by a totally inappropriate aircraft: a DeHavilland Beaver floatplane.

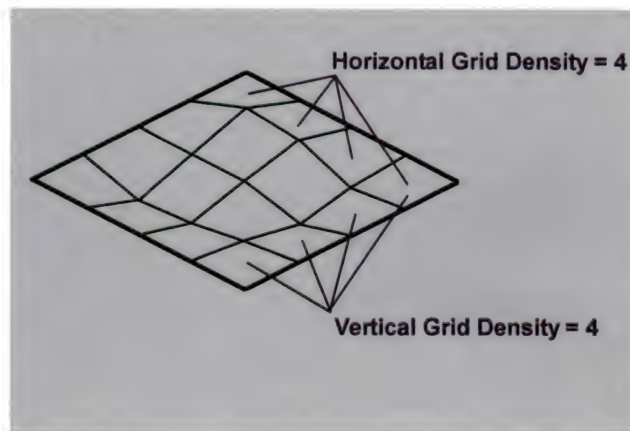
at 8 meters/pixel will come to 90 MB (megabytes) of texture imagery.

Before photo imagery can “qualify” for use in photorealistic scenery, it must be *orthographic*, or taken from a straight-down vantage point. Any perspective other than straight down is called *oblique*. Oblique imagery must be corrected for perspective before it can be used in photorealistic scenery design, and this may result in the loss of resolution on the far end of the image.

Photorealistic scenery in MS Flight Simulator

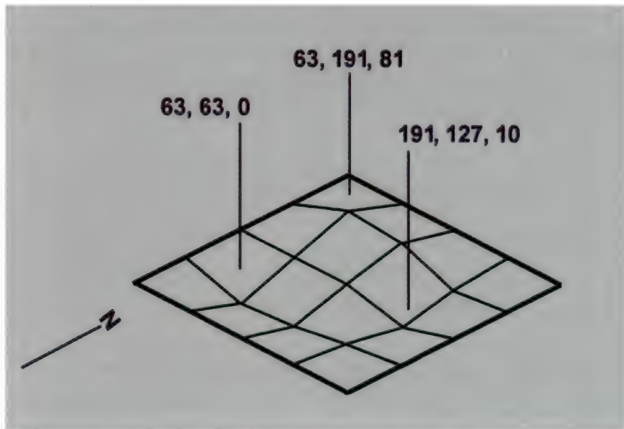
Every version of Microsoft Flight Simulator through FS 98 used a “flat world” elevation model in the simulator. Flat synthetic tiles were used to render the terrain, where different elevation values could be assigned to each individual tile. This is how the ground altitude underneath each airport or location was determined. There were 3-D tiles provided, which would render mountainous regions and areas of local elevation relief, but unfortunately, placing airports or other types of objects on top of them was not allowed. And of course, as your aircraft traveled across these tiles, the ground could be seen rising and sinking as different tile elevations were encountered.

Flight Simulator 98 introduced several localized areas rendered in photorealistic detail, such as the Chelan Mountains in the State of Washington, for example. This type of scenery uses a language command that became known as *TexRelief*, which has in fact been around since version 5 of the simulator. The *TexRelief* command is basically a gridwork pattern, whose grid nodes can be assigned altitude values, giving it an appearance of landscape. Many *TexRelief* patterns, or “chunks” can be grouped together to form a mesh landscape. It suggested the shape of things to come.



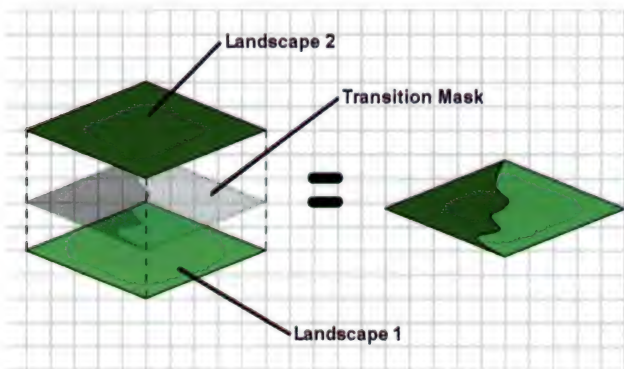
TexRelief command's grid density property. Increasing grid density increases the resolution of the mesh, but this in turn can have severe effects on Flight Simulator's run-time performance.

Creating Photorealistic Scenery



TexRelief command's texture coordinates (based on a 256x256 pixel texture) and altitude records

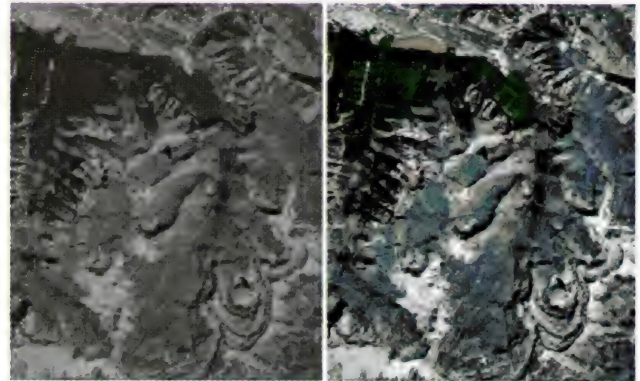
For the 2000 edition of Flight Simulator, Microsoft re-tooled the entire world terrain model. The flat-world synthetic tiles were replaced with synthetic terrain with digital elevation data incorporated into it. The new display engine renders the entire world with accurate, albeit coarse, topographic mesh scenery. This re-tooling also incorporated a new synthetic landscape texturing system, where various landscape textures are assembled into a giant mosaic, and then blended using masking techniques, so that the transition between two landscape types appears gradual.



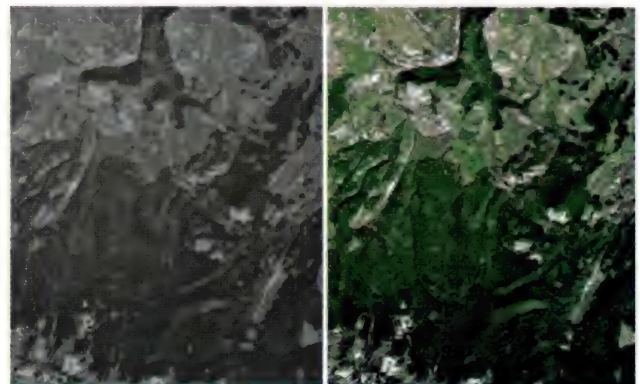
Landscape masking technique in Microsoft's Flight Simulator 2000

But for whatever (presumably technical) reason, Microsoft left out the proper support for replacing the default-texturing scheme with custom photorealistic ones, or even re-texturing in a more limited way. That end of the scenery-rendering engine was, for all intents and purposes, closed to the end user. There has been some great work done by texture artists that replaces the default texture set with new, much better looking ones, but that affects the whole world and there is no provision to modify the localized landscape texture assignments.

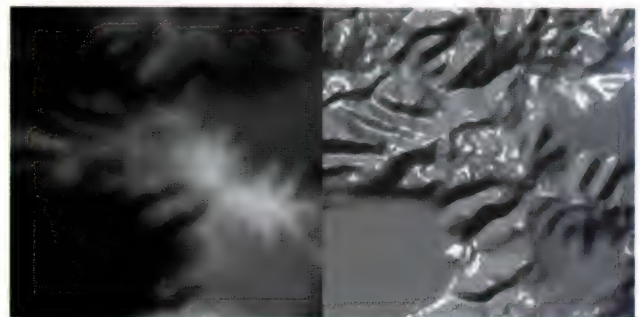
Fortunately, Microsoft provided backward compatibility with the FS 98 and prior scenery, which is categorized as



USGS Orthophoto DOQ in its original form, and enhanced and colorized using image editing software. The area depicted is Telluride, Colorado.



Another example of image enhancement: The dull grayscale original USGS DOQ, and the enhanced, colorized version. Area depicted is Grayhead, Colorado.



An altitude map in grayscale version, and how it would look when the actual relief was shaded. Light Areas are mountains, while dark areas are lowlands.

"Section 9" scenery. This includes most of the visible scenery, other than the default terrain itself, and includes the TexRelief command. So all of the third party scenery creations will still function in FS2000. However, the "Section 9" scenery has a severe visibility limit of approximately 30 km imposed on it, again for whatever (presumably technical) reason. This was particularly disturbing in the case of large-scale terrain mesh scenery,

Scenery Design Corner

where mountains would literally pop up in front of the virtual pilot and disappear in the back. Unless the visibility setting was adjusted to less than 30km, the suspension of disbelief was seriously hindered.

Many third party developers, commercial and freeware, abandoned the TexRelief approach for this and other reasons. Some commercial publishers released patches that basically flattened the default FS2000 scenery below their mesh scenery and suggested adjusting the visibility to 30 km "for best results". The core problems, however, remained. Flattening the default scenery also changes the altitude that the simulator recognizes as hard surface (ground). Without this hard surface capability, the aircraft will simply fall through the TexRelief terrain, since it now would recognize the new flattened altitude as the correct ground altitude. Bottom line...you can't land or take off on it.

Several scenery designers, including Martin Wright, Andras Kozma and myself, continued probing into the mesh terrain design techniques. With the advent of Microsoft Combat Flight Simulator (CFS) and the constant upgrading of the SCASM (freeware scenery compiler) instruction set, new mesh-terrain commands became available for use. One particular command that was named "MeshWith1Texture" was used in CFS to texture large swaths of land with a single, repeating texture. Through manipulation of its parameters this command was adjusted to behave similarly to the "TexRelief" command, but without the need for specifying the texture coordinates, which cut the size of the command to only 1/3 of the TexRelief version. In addition, the MeshWith1Texture command exhibited another property. Through certain manipulation and adjustment, and in conjunction with the new Area E type area block, it could be "forced" to show itself at far greater ranges than the restrictive Section 9 limit of 30 km. Mr. Andras Kozma revealed the particulars of this in early summer, 2000. He discovered that the MeshWith1Texture command would render properly at very high visibility ranges, if:

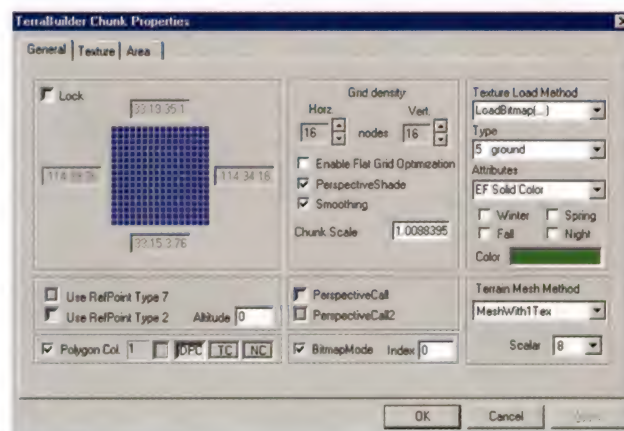
- ✈ The MeshWith1Texture command was used inside an "E" type area block
- ✈ "E" type area block visibility range was set to high (maximum 255)
- ✈ The scale parameter of the geographic reference point (RefPoint) command was set to 8
- ✈ The altitude and size parameters of the MeshWith1Texture command were scaled down by factor of 8 (so that, with the RefPoint scale factor of 8 all dimensions would come out properly)

This changed everything, and the flight simming community owes gratitude to Mr. Kozma for this find. I have since verified this and incorporated it into the latest versions of my software, TerraBuilder.

TerraBuilder

TerraBuilder is a Windows 9x/ME application that is geared toward the production of photo-realistic scenery for Microsoft's Flight Simulator series, including FS 98, Combat Flight Simulator, and FS 2000. Basically, it takes a large aerial or satellite image of the area and formats it for use as scenery in Flight Simulator. Also, several formats of altitude data (called Altitude Map in TerraBuilder) can be imported. Altitude data transforms flat scenery into true 3D topographic mesh scenery.

The TerraBuilder scenery designer differs from other programs, in that it is specifically geared towards production of photorealistic mesh scenery. If a 3D object or an airport needs to be designed and placed on top of the photorealistic scenery, other software should be used in addition. Then, both photorealistic mesh and 3D objects/airports can be mated and adjusted to appear together in the final scenery.



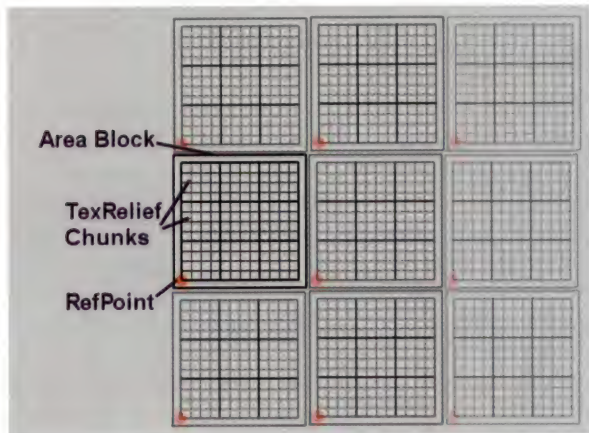
TerraBuilder Chunk Properties dialog, a control dashboard for scenery properties. Multiple chunks can be selected and its properties modified collectively.

TerraBuilder is a SCASM "front end" program. It creates source text files and invokes the SCASM compiler that uses the source files to compile them into the BGL-format scenery files required by Flight Simulator. Internally, it slices the photorealistic imagery into the size formats needed (up to 1024x1024 pixels, extended bitmap format) and assigns the texture to the TexRelief/MeshWith1Tex commands. In TerraBuilder, this single element is referred to as a "chunk". Chunks are assembled into a matrix-like mosaic, comprising a scenery project. One, several, or all of the chunks can be grouped into Area blocks (SCASM command for basic scenery building blocks). Each chunk is user-

Creating Photorealistic Scenery

accessible and all of its properties can be changed or adjusted.

Aside from this basic functionality, TerraBuilder is capable of inserting several other scenery elements, such as start up locations and scenery 3D macros. Default airports, navigation aids and stock buildings are features that will be implemented in the upcoming version.



TerraBuilder's Area block configuration. In this case, each Area block consists of 9 TexRelief chunks with a grid density of 4x4.

Inherent problems and conflicts with the default scenery

Photo-realistic scenery is meant to replace the default scenery by completely covering it. Since the default scenery will inevitably differ from the photorealistic mesh scenery, there are bound to be some conflicts between the two. For instance, the new mesh scenery might be defined at a higher resolution. Some riverbeds and canyons that were completely skipped by low-resolution default scenery might be present in the photorealistic mesh, and in this case the default mesh scenery will show up through the photorealistic scenery. Also, default and photorealistic scenery will unavoidably have very close, if not identical, elevation values, causing a z-buffer conflict that will exhibit as "shimmering lines". When this happens, it would be prudent to flatten the default terrain using Microsoft's Flatten command in the FS2000\Scenery.cfg file. While this command does its intended purpose, it has one drawback: It removes the hard surface of the new photorealistic mesh scenery as described previously. The alternative is to re-define the default mesh and render it flat under the area where the photorealistic mesh will be. This is possible by using Microsoft's Terrain SDK, and it is a separate topic altogether.

The solution to large-scale photorealistic scenery design

As mentioned before, photorealistic scenery is very storage demanding. Depending on the resolution, relatively small areas of scenery will demand large amounts of imagery. While TerraBuilder can comfortably support large-scale imagery to create individual texture chunks, editing this imagery in a photo editing application, such as JASC Paint Shop Pro or Adobe Photoshop, can become quite a cumbersome task, especially when it is in its 24-Bit true color form. I found, from my personal experience, that it is much easier to sub-divide large-scale imagery into smaller segments that are more manageable in image editing applications. These smaller image segments match perfectly to their neighbors on the edges, and are usually not larger than 2048x2048 pixels. Then, for each one of these smaller image segments, a separate project is created in TerraBuilder. The trick, however, is to define the extents of the neighboring projects so that they are spatially positioned precisely next to its neighbor, forming one contiguous terrain cover. This is where the Project Cloning comes into play.

The "project cloning" option makes it possible to define a clone of the existing project with the same dimensions and parameters as the parent project, located immediately next to the parent project in all 8 directions. The cloning method makes it possible to quickly and accurately built up a large photorealistic scenery area. The only thing that the program requires is the new aerial image, which would be prepared in advance, and adjacent to the image of the parent project.

With our imagery subdivided into smaller segments, we start with one parent project and determine its exact location in the real world. TerraBuilder's two-point calibration functions can be used together with Microsoft's Streets and Trips Auto map / trip planner together, by locating the area on the parent image and finding the corresponding location in the Streets and Trips. The exact geographical coordinates of two prominent locations on the image, such as road intersections, can be read off of the Streets and Trips planner. Once the location of the parent has been precisely established, the cloning can begin.

With the parent project active, a project clone is created on top of the parent project. A TerraBuilder PhotoWizard interface is invoked, and the only parameter that it needs specified is the location and name of the new image. Once the clone is created, it can be set active and another clone of can be created on the top of it, or in any other direction. A successive iteration of this process quickly builds up a large array of contiguous projects. All you need to do now is to compile all these projects into scenery.

Scenery Design Corner



TerraBuilder PRO application in action, with a photorealistic project loaded

Project grouping

Another new feature in TerraBuilder is the Project Grouping option. This option allows for several TerraBuilder projects to be grouped and compiled into one single scenery. The need for this approach arose when it was recognized that there could be only one Area "E" type (the only area type that allows for extended visibility) can be present and visible in flight simulator at one time. If there are 2 or more, or if there are other area types, Flight Simulator starts to behave erratically, displaying strange visual effects at best, and crashing or locking up at the worst.

Basically, the Project Group option lets you multiple-select projects you wish to group. It then creates a list (which can be saved and loaded) of projects that can be compiled together into one large scenery (BGL) file. So, with our array of cloned projects created, all you need to do is create a Project Group and compile them.

Limits and shortcomings

As a test bed project for these features, I have created 32 contiguous projects of 2048 x 2048 images. Each image yields four 1024 x 1024 texture chunks (the largest size allowed by FS 2000), so the total number of textures/chunks is 128. At 1,367Kb per texture, the project is close to 180 MB (uncompressed) for imagery only. I have not encountered any compilation problems or memory limits with a Project Group of this size, as I have not yet determined how many projects can be "crammed" into one "E" type Area block. However, some limit probably exists and only further experimentation and pushing of the envelope will tell what and where it is.

One other observed limitation is that Area "E" type block does not like any other Area blocks in its vicinity, which also includes other Area "E" type blocks. With that in mind, one should take care not to design scenery areas in vicinity of each other: Either group them into a single Project Group, or set the Area display ranges sufficiently small so that FS2000 scenery engine is sure to remove one area before loading another.

Looking toward the future

With all the research and development that has gone into making photo-realism a viable option in FS 2000, it is still an interim solution and a clumsy patch at best. The Area "E" type solution for photorealistic scenery in FS 2000 has turned out to be a back-door solution that will certainly leave more than one software engineer at Microsoft's Flight Simulator team cringing. As mentioned before, for whatever (presumably technical) reasons, Microsoft did not include support for custom terrain textures in the 2000 edition of Flight Simulator. Until this shortcoming is fixed (hopefully in the next incarnation of Flight Simulator), this is the best solution, to my knowledge, for the photorealistic scenery in Flight Simulator 2000. When the next version of Flight Simulator is available with support for custom terrain textures, TerraBuilder will support new formats as soon as they are available so that the photorealistic scenery Projects created for FS 2000 will be seamlessly carried over to the new format. The imagery, which usually comprises 90% of the designer's time and effort, should be completely re-usable in the new format and not wasted. Therefore, any effort at designing photorealistic scenery for FS 2000 using the available techniques presented in this article will not be in vain. Hopefully, it will lay basic and necessary groundwork that will be essential in the photorealistic scenery design with Flight Simulators of the future.

For More Information

You'll find more information about TerraBuilder on their website:

<http://www.terrabuilder.com/>

Optimizing

Windows 95/98/ME For Flight Simulator 2000

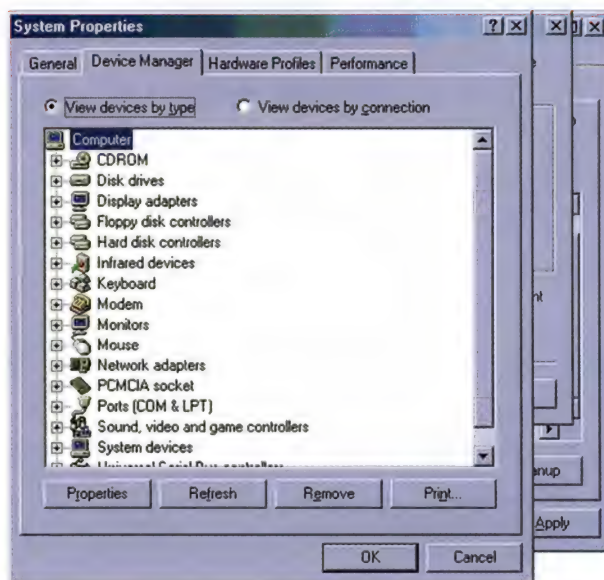
By Katy Pluta

First checklist

The first thing to do is to check what we would call the basic configuration of the computer and the Windows Operating System. It is not vital, but usually highly recommended that you obtain and install the latest final versions (not the beta) of your PC motherboard BIOS and drivers, and the current BIOS and drivers for your video card and other hardware installed in the computer. The "Golden Rule" in fact would be that if it works fine, don't try to fix it. However, if you are experiencing problems, these files and drivers are good starts for trying to cure them. Check with your vendor, or preferably on the manufacturer web site and see if updates are available, and how to download and install them. If you do not feel comfortable doing it, have someone knowledgeable install them for you.

A good place to start and check if Windows recognizes and drives the computer correctly is the System Device Manager that you reach **via Start Menu – Settings – Control Panel – System**. You will see a list of hardware components in your system, and if you see an exclamation or question mark near the name of a device, check and see what Windows tells you about it and update/re-install the drivers, or modify the resources if there is a conflict.

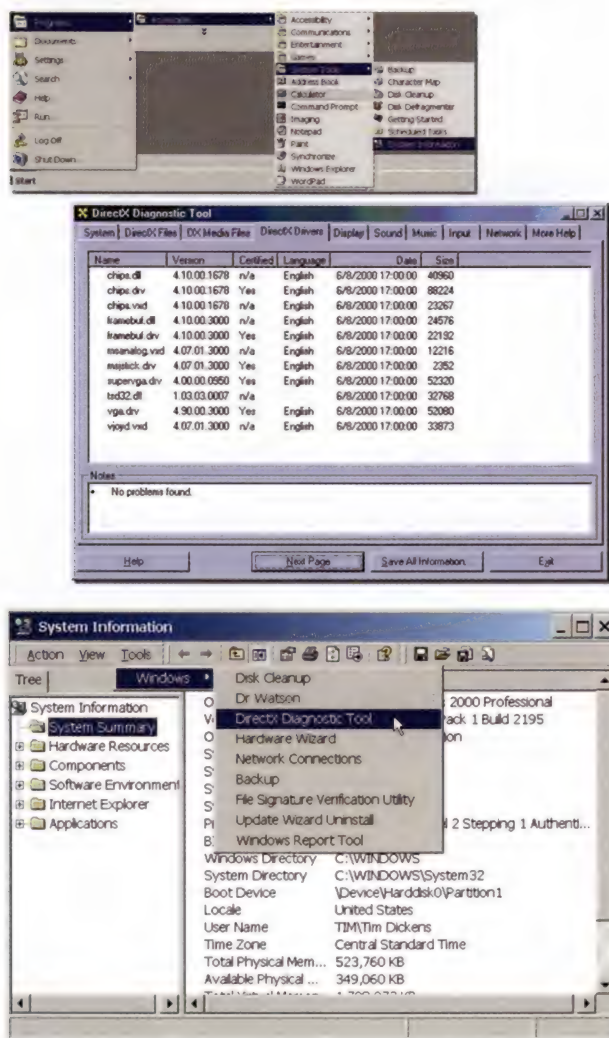
Microsoft Flight Simulator 2000 is a very demanding program, requiring a lot, if not all of the resources available from your computer. It is not too forgiving either when other programs are stealing memory or CPU usage from it while running at the same time or with a hardware/software configuration that is not well tuned. Let's see what we can do to optimize a Windows 95/98/ME computer, and try to avoid those lockups and errors as much as possible while on final after a long and stressing flight!



A place to start and check if Windows recognizes and drives the computer correctly is the System Device Manager.

Optimizing Windows

Another item on this checklist is the state of DirectX, the Microsoft API (Application Programming Interface) used by Flight Simulator 2000. You can run the DirectX diagnostic tool by going to the **Start Menu** and selecting **Programs/Accessories/System Tools/System Information**. The DirectX dialog box is under the Tools menu. Go through the different DirectX video and audio tests to check your hardware compatibility. Don't worry if a file is reported uncertified, since there are actually very few manufacturer's drivers on the market that are "Microsoft Certified." However, if a test fails, you definitely **do** need to be concerned. In this case, the best thing to do is try to upgrade the drivers for that particular device. Pay particular attention to the version of DirectX you have installed before selecting a driver.



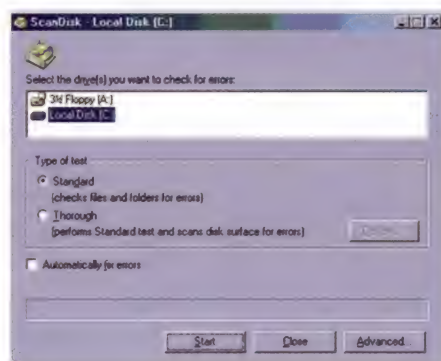
The DirectX dialog box provides you with a great deal of information regarding the health of your DirectX environment.

Assuming that there is no configuration problem that could prevent Flight Simulator 2000 from performing at its best, let's see how to maintain our system and keep it in good shape!

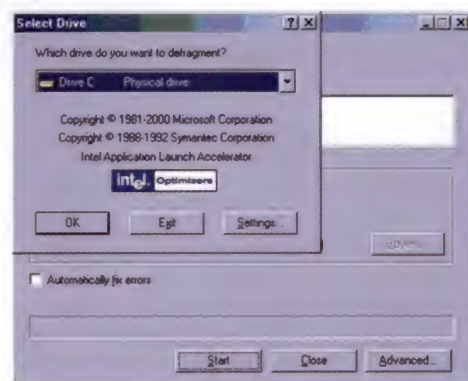
Maintenance checklist

Usual maintenance calls for regular and frequent use of some critical Windows accessories:

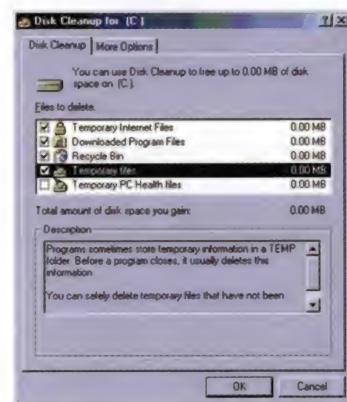
- ❖ Use Scandisk to check the hard drive for physical damage (bad sectors) and to insure that the structure of the folders and files are correct.



- ❖ The Defragmenter locates fragmented files and folders on the hard drive and puts the pieces in one place together to boost file access.

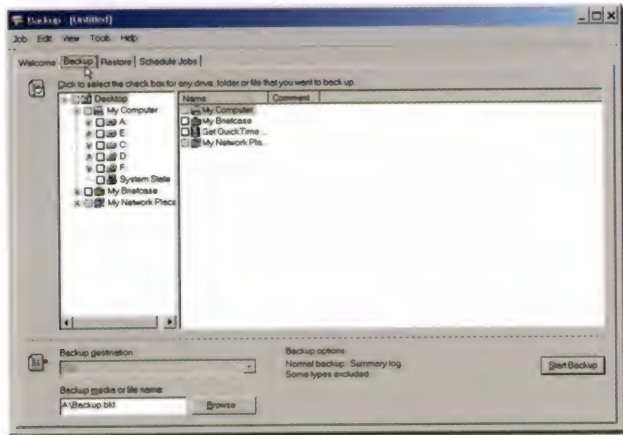


- ❖ Most versions of Windows come with a Disk Cleanup utility to delete temporary files, use it to remove temporary installation files after each software installation, and on a regular basis for all type of files.

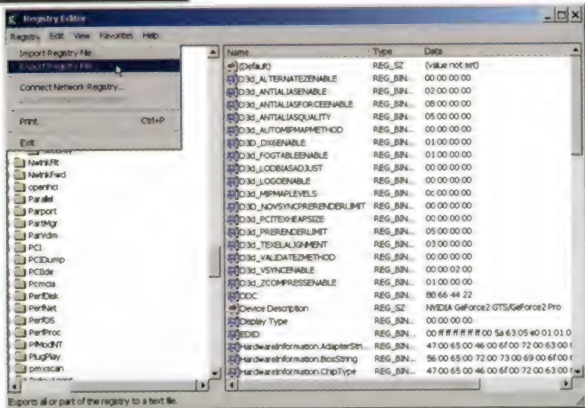
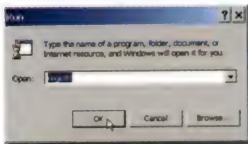


Optimizing Windows

Not specific to virtual flying, but highly recommended to any computer user is to regularly backup important personal files such as E-mail address books, or all those FS downloads, for example. However, most importantly, your system registry files need to be backed up, preferably on a tape, floppy or ZIP disk, CD-ROM, or even a second hard-drive. You can find the Backup utilities in the **Start – Accessories – System Tools** menu of the Windows Start Menu, or you can use third party programs to the same effect. You can also use the Export Registry function in the regedit program by selecting **Start – Run – regedit**. The exported file can then be saved in a safe location.



The Windows Backup utility will assist you in backing up critical system and personal files.



The Windows utility Regedit will not only allow you to edit your system registry, but will also allow you to export the data to be saved in a safe location.

To help maintain the system there is also a program that you can download from the Microsoft web site by doing a search for the Q147769 article in the Knowledge base, and use it regularly: RegClean, a Registry cleaner that removes erroneous entries from

the registry. Please read the complete article to learn more about this tool and how to use it.



The Microsoft utility Regclean can be used to remove erroneous entries from the registry.

Another regular thing to do to keep the system upgraded is to use Windows Update, an online extension of Windows accessible from your **Start** menu. The web site includes a Product Updates catalog with fixes, updates, and enhancements to Windows and other programs. These are files that you can download and install directly from the Windows Update site and customized for your specific computer configuration.

Optimization checklist

First we will talk about removing all the unnecessary programs running in the background and stealing your scarce system resources that could help Flight Simulator 2000 run better, faster and sometimes more stable. Afterwards we will want to *add* some programs to our system.

When a Windows session starts there are some files and programs that are automatically loaded each time. The more obvious are the programs with icons you see in your system tray on the task bar. Common examples are anti-virus programs, scanner software or many non-essential multimedia goodies installed with Winamp or Real Player. Some of them can be removed simply by going to the startup folder in the **Start** menu – **Programs** folder, deleting them and rebooting. If you find the program “Office Find Fast” in this menu kill it without remorse, it is installed with Microsoft Office and will put a halt to Flight Simulator 2000 or any extensive application when launching itself to index the files on the hard drive. Unless you keep and use thousands of Office files, it’s unlikely you’ll ever regret deleting Find Fast!

Some DOS devices, unnecessary with Windows if not using DOS applications, can be loaded at startup using the files `config.sys` and `autoexec.bat` located at the root of the C drive. To check if your system really needs them, rename those two files via Windows Explorer to `config.bak` and `autoexec.bak` and restart. If you discover later that one application requires the DOS device,

Optimizing Windows

you can rename the files. You can also run the **Sysedit** utility by going to the **Start – Run** menu and typing **sysedit**, and temporarily remove an entry by typing REM (for ‘remark’) next to it, and prevent it from loading when you re-boot.



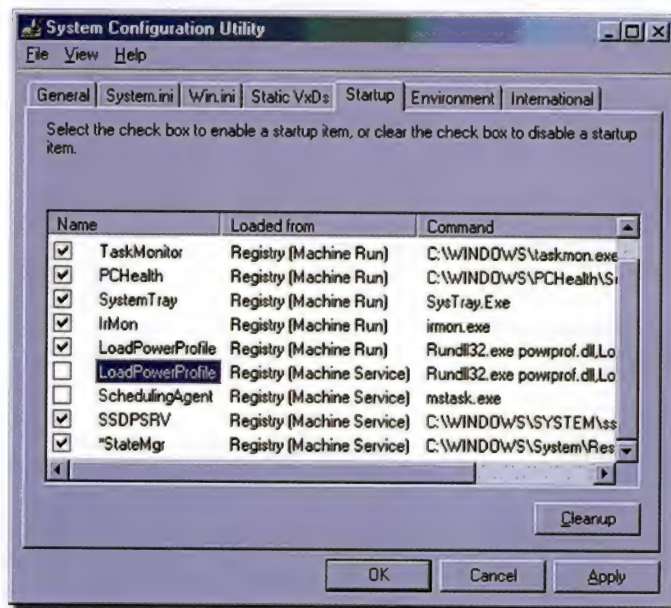
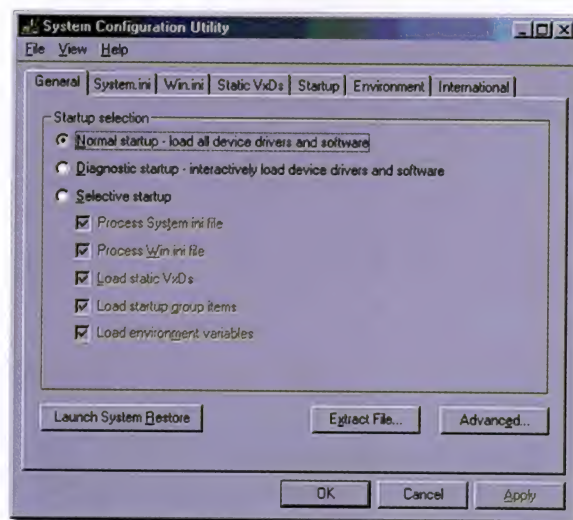
The Sysedit utility can be used to remove unwanted DOS programs from your windows startup routine.

Some unnecessary programs are loaded via other system files that Windows uses when it starts-up. One way to see what is currently running on the PC is to press simultaneously the **(Ctrl)**, **(Alt)** and **(Del)** keys only **ONCE**, careful not to do it twice or Windows 95/98 will reboot! You can also run the System Configuration utility from the accessories list on the Start menu previously mentioned. You might be surprised by the number of tasks which you will find running!

Only the following tasks are essential on all systems: *Explorer* and *Systray*. Systray loads those programs in the System Tray on the lower right-hand side of your screen. These may or may not be necessary, but your scanner, anti-virus software, or whatever programs you may actually want will not work if Systray is not loaded.

Some of these programs may be required for a particular PC to run, and the only way to *really* know is to prevent them from loading and see if Windows still behaves. To do this there is a program in Windows 95/98 (not Windows 2000) that you launch via the **Run** command in the **Start** menu by typing **msconfig** and press enter. This is a shortcut to the part of the utility that you can access using the System Information dialog menu. Go to the **Startup** tab and you will see a list of the programs that are loaded each time you start up a Windows session. You have the possibility to uncheck them and test what happens afterwards. Remember that the fewer tasks in the background, the better Flight Simulator 2000 runs, and the more stability your system will be. You will likely see that some tasks may appear twice, like loading the power profile for the laptop we used for this bitmap. You can also disable the loading of MS Task Scheduler if you do not currently use it.

Another way to end unnecessary programs running in the background is to use a freeware application called “End-It-All” that you can download on ZDNet.com. It will attempt to close the background tasks that you select via its menu. Of course, loading a program to shut down others does not seem the more efficient method, but it can be more practical, especially if you do not feel confident modifying system files using the msconfig tool.

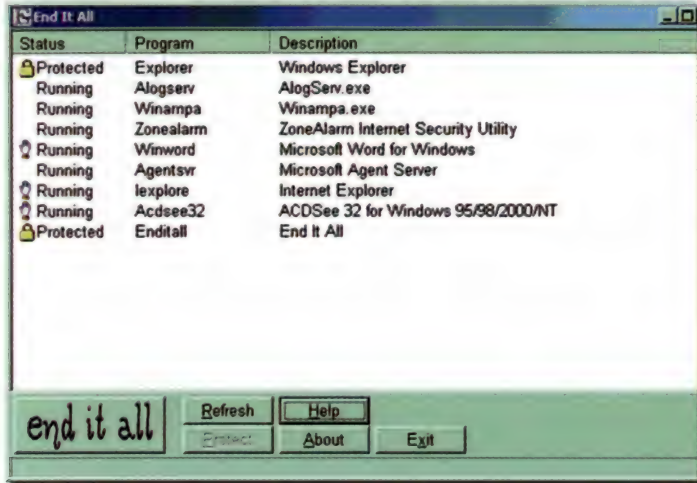


The Windows msconfig utility will allow you to select which programs load at system startup.

As a special note to pilots flying online: keep your firewall software running. It usually does not interfere with Flight Simulator 2000, and the protection it offers far outweighs the little resources spared. One thing you can do is to shut down the system scan feature of your anti-virus software before launching Flight Simulator 2000. Otherwise, it will likely slow the simulator

Optimizing Windows

down. Do not forget to turn it back on afterwards, or better yet, restart another Windows session. It is also highly recommended to restart a session before or after some virtual piloting, so Windows starts afresh and no remnants of previous applications are left behind to cause slow-downs or problems.



The utility "End-It-All" that you can download on ZDNet.com can assist you in controlling what programs are running in your Windows environment.

Another very neat and useful program is Cacheman, a utility that tweaks the disk cache (Windows drive cache called VCache) settings and prevents frequent swapping of the data to disk. By default, Windows can let this cache grow and use a lot of RAM that could be better fitted to hold Flight Simulator 2000 resources. The best setting we experienced on Windows 98 systems for using Flight Simulator 2000 is "Power User." You can experiment and find which setting suits you best.

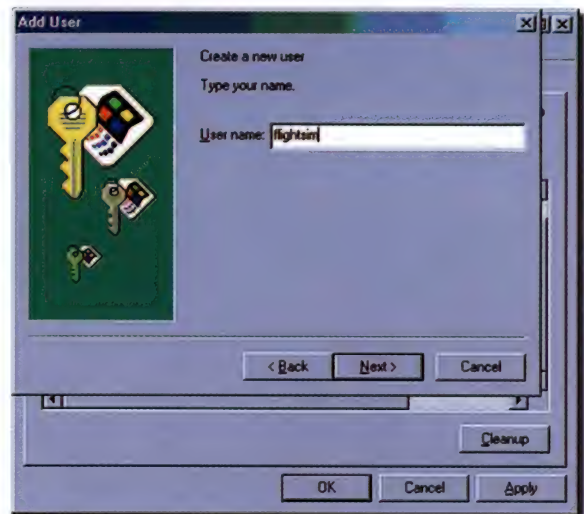
However, Cacheman does not control the Windows swap file holding the virtual memory. This setting can be found via the System icon in Control Panel, under **System Properties – Performance tab – Virtual Memory**. Windows controls the size of this file by default. It is temporary storage on the hard drive for program data that does not fit into the physical memory available in the computer. If you wish to modify its size, a rule of thumb is to give it a fixed size of 1.5x the physical amount of RAM. Example for a computer with 128Mb of RAM would be a swap file fixed to a size of 192Mb, once again experimentation prevails but it must be noted that some other applications than Flight Simulator 2000 may not like the same virtual memory settings so be careful.

Another note on this same subject that is worth mentioning: if you run Flight Simulator 2000 and several other related add-ons, with maybe a very complex aircraft model, panel and

scenery, the system may simply run short of memory altogether. With Windows 95/98/ME it will simply shut down the application and leave you staring and grumbling at the desktop. If you gave a fixed size to the swap file, it could be worth increasing it.

Creating a custom Windows profile

The better way yet to start a ready-to-fly Windows session is to create a specific user profile, named "flightsim" for example, that you will customize as required. So you can log in with your usual profile when working or browsing the net, with all the goodies loaded at startup, or log in after restarting Windows as the Flight Simulator Red Baron with a bare system and plenty of resources available. Do not simply log off and log in again. Restart a new Windows session, as you would do when switching between work and game activities. This way you will not have to ready the system by shutting tasks down, not loading them at all is the best way to keep more free resources.



Optimizing Windows

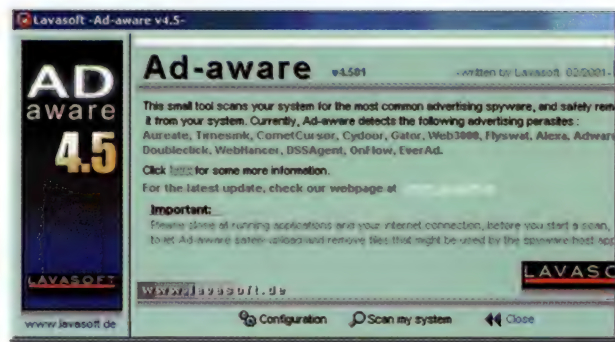


A custom Windows profile for running Flight Simulator can be created to optimize performance characteristics

You will find the User Settings via the Users icon in the control panel. It will automatically allow you to create a new user profile the first time, by enabling the multi-user feature. Check Windows Help to see how to proceed with your system.

Taking out the trash

Another important thing to bring to your attention is the possibility of **spyware** being on your system. Spyware is advertising programs running in the background of your system, very often installed as companions of other programs, or self-installing via the web and an Active-X control. More often than not, these programs are stealthily and masquerade themselves as useless utilities. They keep track of your browsing activity and report information without your notice to an external party, via your Internet connection. Notwithstanding the security hazard these programs can represent, they very often jeopardize the stability of a system and eat up resources. A very useful program called Ad-aware from Lavasoft can help you clean these trash out of your system. If you often browse or install freeware/shareware programs, checking for spyware and removing it from your system should be a part of your maintenance checklist as well.



The utility Adware from Lavasoft can be very useful in the removal of insidious spyware from your system.

Windows 2000

A note on Windows 2000 Pro, and the future Windows XP Personal and Pro versions; these versions of the Windows Operating System are based on the NT kernel (Windows NT) and do not need, and will not let you apply most of the optimization and maintenance measures mentioned here. All the optimization tips we just described are intended for Windows 95/98 and Millennium editions. Windows 2000 and XP Personal (that will be the next consumer Windows scheduled for release later this year) are much more stable than the Windows 9X series in the use of Flight Simulator 2000. That is, provided that the hardware/software configuration of the computer is compatible with the Operating system.

I hope you found this information useful. Many aspects of the Windows operating environment can affect performance or cause problems, such as system crashes or lockups. What I have outlined here are some of the most common problems and remedies, but of course, there is no way of predicting what kind of hardware/software conflicts that can arise on any individual system. The best way to avoid problems is to keep your operating environment healthy, and head these problems off before they start.

For More Information

You can find the program EndItAll by doing search on the Zdnet website:
<http://www.zdnet.com>

You can find the Cacheman utility at:
<http://www.outertech.com>

The Ad-aware program is available at:
<http://www.lavasoft.de>

Configuring Windows 2000

By Tim Dickens

Although the Windows 2000 operating system is much more advanced and stable than the Windows 9X series, a few things still carry over. Most importantly, the necessity of closing down unwanted (and unneeded) programs running in the background. Even though Windows 2000 on the NT technology platform is much more stable, the guileful practice among many software vendors of automatically assuming that you want their program running and at your beckon call at all times still exists. Their software installation will typically attach their program to your startup profile, and over a period of time you end up with everything but the entire NATO missile defense network running in the background on your system. This can slow things down no matter how stable the system is, and how much RAM you have.

First, you need to know exactly what is running in your software environment. To do this you still use the same path previously mentioned to get to the System Information dialog menu. This will tell you what is running. Don't be shocked when you see a long list of running programs. This is normal, and actually happens under the Windows 95/98/ME environment too. You just don't see such a comprehensive list in the Windows 9X platform. One very useful feature is that it tells you *everything* that is running, where it is running from, how much memory it is using, and what **priority** that memory is allocated to. Priority simply means what address in memory has "first dibs" from the operating system. Windows 2000 will allow you to not only view this, but to change it as well.

This can be done from Windows 2000 Task Manager, which is also the quickest way to see what is running on your system. To do this, press Ctrl + Alt + Delete, like you would do under Windows 9X. However, what you get in Windows 2000 is quite a bit more advanced. Select Task Manager and you get the same list you see in System Information, rather than the few items listed in the Windows 9X environment. This is *everything* running in Windows. You can shut any program off, or change its memory allocation priority. But be advised that you need to make *sure* that a program is not needed before shutting it off, or changing its priority. If you run Task Manager while FS 2000 is running, you will see how much memory it is using, typically 100 MB to start. Windows 2000 usually gives it high priority by default, so changing this is not necessary. This menu can be a very useful tool when trying to manage your resources.

Once you have an idea what is running in your environment, you will likely see some dead weight on the list. You can control the programs that start automatically in Windows 2000, but it works a bit different than the Windows 9X platform. It is done through the system registry. So, do we need to tell you to back this registry up before making changes to it? You do this the same way as we mentioned previously for Windows 95/98/ME.

In Windows 2000, type regedit, or regedt32 (either one) from the Run command. You get to the section that controls automatic startup with this path, on the HKEY_LOCAL_MACHINE menu:

Software/Microsoft/Windows/CurrentVersion/Run

This is the complete list of what is designated to load whenever Windows 2000 starts. You can delete any unwanted programs here, but make sure you have backed the registry up first! Using regedit32 you can save registry keys individually, and it's a good idea to do this as well before making changes here.

You can also set up a special profile for running flight simulator, much the same way as in Windows 9X, when you are logged on as System Administrator. This is accomplished via the User Profiles tab under the System icon in Control Panel.

This is about all you need to know to keep your Windows 2000 environment optimized for running flight simulation programs.

W2krunning

The System Information dialog menu in the Windows 2000 environment, showing the running tasks and their priority.

W2Ktaskman

The Windows 2000 Task Manager will allow you to shut off any program running in your software environment, or change its memory allocation priority.

W2kregedit

Control of the startup programs in Windows 2000 is accomplished through the system registry.



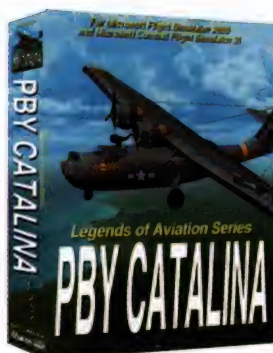
Six great carrier-based planes challenge you to set 'er down on a short, narrow moving target.

The package includes U.S.S. Nimitz in great detail and six aircraft (F/A-18C Hornet, F-14D Tomcat, A-7E Corsair, TA-4J Skyhawk, S-3 Viking & E2C Hawkeye).

Carrier-based flight tests your piloting skills unlike any other flying that you're ever likely to encounter. Are you up to the challenge? This impressive fleet of *Flight Deck II* aircraft keeps you on the edge of your seat!

1-55755-446-3

\$29.95



During World War II, the Catalina served as an intelligence-gathering aircraft. But it also served in search and rescue missions and performed small bombing raids as well. The *Legends of Aviation Series* pays tribute to these monuments of aviation with four authentic versions of this impressive aircraft: a land-based civilian model, a water-based civilian model as well as both a land and sea version of the military Catalina.

The Princess is visually breathtaking. The developers mastered special techniques such as shining landing lights, silky-smooth landing gear motion, working wipers and fully-functional custom instrumentation!

1-55755-441-2

\$29.95

Pacific Theatre add-on brings you twelve of the most famous U.S. and Japanese planes that saw battle in the Pacific. These authentic planes were created especially for CFS by designers Terry Hill and Dennis Wasnich.

Pacific Theatre add-on brings you the Hawaiian Islands where the war in the Pacific first started- Pearl Harbor. The missions and battle scenes have been laid out according to historical records such as these.

An add-on package for Combat Flight Simulator wouldn't be complete without missions. The *Pacific Theatre* missions were created based on actual events at Pearl Harbor in 1941.



1-55755-447-1

\$29.95



Battle for Midway features ten of the most famous U.S. and Japanese planes used in the Midway and Coral Sea areas, as well as two bonus planes- the twin-tailed P-28 Lightning and J7W Shinden "pusher." The *Battle for Midway* missions based on actual events of the Coral Sea and Midway Islands in 1942.

You'll fly in the uncharted skies to face a relentless enemy. The exploding "mission objects" are finely crafted 3-D enhancements that behave as you'd expect them to in combat, exploding when hit with artillery fire!

1-55755-445-5

\$29.95

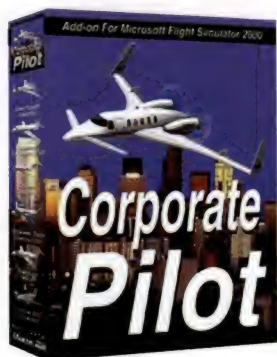


Abacus has several best-selling add-ons for Microsoft Combat Flight Simulator, which shows our commitment to this popular and flexible platform. The aircraft in *Pacific Theatre*, *Battle for Midway*, *Wings Over China* and *Tuskegee Fighters* are among the most famous of World War II.

We've taken the best of these warbirds, all crafted by noted designer Terry Hill and put them into *Combat Squadron*, which will give you 18 great planes for CFS2, CFS 1 and FS2000!

1-55755-440-4

\$29.95



Corporate Pilot puts you in the left-hand seat of the speediest, most luxurious and sexiest planes available. Your job is to fly the cream of the crop in this expensive fleet of personalized aircraft (including Beechcraft Starship Rockwell Twin Commander, Cessna Citation X, Dassault FalconJet 2000, Cessna 441 Conquest and BeechJet 400A).

We're known for the visual impact of our aircraft. You'll see the difference in the rounded parts, elegantly transparent glass and smooth, moving surfaces. Also, you won't be surprised that we've extended the fine detailing to the inside of the aircraft.

To add more realism, *Corporate Pilot* includes several Round Robins that simulate the hectic schedule of a corporate pilot. You'll fly the demanding routes that your CEO requires, complete with flight plans, charts and air traffic control accompaniment.

1-55755-435-8 \$39.95



As its name suggests, the *Tips & Tuning Guide* provides a road map for performing the tuning and customization of FS2000 for maximum realism, maximum performance or anywhere in between.

You'll learn about changing the sounds of the aircraft, customizing your instrument panel, adjusting the realism settings, using FS2000 weather, changing image quality, finding the FS2000 Easter eggs, customizing joysticks and controllers, changing aircraft flight dynamics and more.

Also, if you can't wait it's also available for electronic delivery by download. The Electronic Edition contains the same information as the printed book but can be delivered to you rapidly- and you also save the shipping charges!

Check the Abacus website for more information.

1-55755-439-0 \$19.95

The *VFR Private Pilot Training* course is to be used specifically for flight training with Microsoft Flight Simulator 2000. By following the step-by-step approach, you'll learn VFR piloting based on five sound, practical lessons developed by aviation experts. The instructor talks you through each interactive, timed lesson. Your score depends on the quality of the maneuvers and your response to the instructor's requests. You'll train in Socata's new TB-10 Tobago Trinidad single complete with unique instrumentation. Each lesson has voice accompanied instruction making them completely interaction and easy to follow.

1-55755-436-6 \$39.95



This is the next generation design software for Flight Simulator 2000. *FS Design Studio* uses a Computer Aided Design (CAD) approach to designing real world models so you can visually and graphically interact with your design.

The *FS Design Studio Pro* package includes several tools, powerful features and time saving shortcuts for creating almost any kind of accurate, detailed 3-D textured object for the FS 2000 environment and is used by both novices and professionals.

Whether your goal is to drop a simple 3-D object into your local airport, add a more detailed stadium for your favorite team or undertake complex aircraft for your growing personal fleet, *FS Design Studio Pro* is the tool for all of these tasks.

1-55755-411-0 \$59.95



Private Pilot lets you fly the best of the light planes. You'll recognize most of the aircraft here since they're among the world's most popular models, as well as a few that many aviators can only dream about flying.

The attention to detail assures you that these lucky thirteen singles and twins look like the real thing.

When you step into a new plane, you should practice a few hours to become acquainted with its flying characteristics. We'll take you to Island Airpark located in Lake Michigan but not too far from Meigs Field. There you can practice your skills, whether it's a short field takeoff over 50 foot obstacles or a soft field landing, shooting the ILS in bad weather or holding over the NDB and other challenging maneuvers and approaches.

1-55755-410-3 \$39.95

Battle of Britain

By Rod White

Microsoft's Combat Flight Simulator 2 is no longer the only new WWII combat flight simulation that will be tugging at your wallet. Rowan and Empire Interactive have also got into the mix with *Battle of Britain*. Rowan, who are previously known for titles like *MiG Alley* and *Flying Corps Gold*, have teamed up once again with Empire Interactive and have embarked on creating what might very well be the best simulation depicting the Battle of Britain ever.



Great historical videos accompany the campaigns

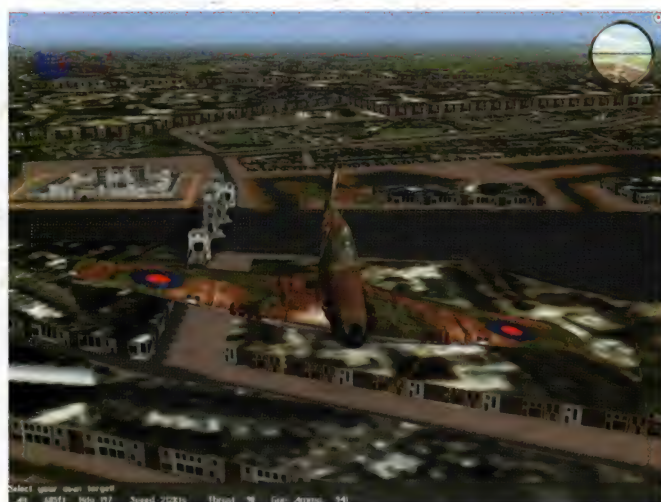
Rowan and Empire Interactive are one of the few, and quite possibly one of the last developer/publisher teams that have been known for creating in-depth and engrossing combat flight simulations for the PC. After having eagerly awaited *Battle of Britain*, I must say that I really like what I've seen.

It's a known fact that we've already been bombarded with enough WWII combat simulations set in Europe (*Combat Flight Simulator*, *European Air War*, *WWII Fighters*, *Luftwaffe Commander* and *Nations*) from the 1998 holiday season through to mid-1999. It's almost enough to bore any combat simulation enthusiast to death (although *Combat Flight Simulator 2* has certainly given us something refreshing with its great WWII Pacific Theater scenarios and planes.) Wayward and Microprose's *B-17 2* also offers players something that they've cried out for too, a bomber simulation and the means to micro-manage the crew aspect. However, don't let those titles overshadow *Battle of Britain*, because it's not just "another" simulation taking place over Europe. Rowan and Empire Interactive have something cool to offer us all in *Battle of Britain*.



Turkey shoot! (top); Bombs away (center); Great external views (below)





Sight seeing over London (top); One of the many factories depicted on the ground in England (center); German bombers under attack by RAF fighters (below).



The Aircraft

The flyable planes include Spitfire Mk I + II, Hurricane Mk I + II, Me 109, Me 110 and Ju 87 Stuka.

You can also man any one of the 3 main gun positions in a Do 17, He 111 or Ju 88, so the variety offered is outstanding. Other planes you'll encounter include the RAF Defiant and Blenheims. Unfortunately there are no "strictly bomber" aircraft to fly, but you'll be protecting, shooting at, and flying along side many of them in the simulation.

Like the Rowan titles MiG Alley and Flying Corps Gold before it, the flight modeling is as realistic as one would expect in Battle of Britain, with the addition of full engine management to boot. This includes prop-pitch control and the means to manipulate the controls by maneuvering the mouse within the fully interactive 3D-cockpits. Novices or greenhorns can also opt to use the simpler flight models, to ease their way into the full-blown simulation. Making it accessible lets Battle of Britain be as easy or as hard to fly as you desire, so it should appeal to more than just the hardcore enthusiast crowd.

Battle of Britain is based on that historic conflict, but unlike most historical simulations, players are able to alter the course of history in the game. Moreover, if they play their cards right, they can even win the battle as the Luftwaffe! I enjoyed this feature because it allows for much richer gameplay possibilities.

If it's large-scale battles you're looking for, Rowan claims there are up to 256 planes at once modeled in the air, and many of the historical 1,000 plane raids are actual missions in Battle of Britain! I've seen these large formations first-hand and I must say it's an impressive sight to see that many planes incoming all at once in the skies over Britain. It's even more thrilling shooting them down in the skies filled with other planes right along side you. Things can get hairy to say the least in the skies of Battle of Britain.

Graphics

The graphics engine is an enhanced version of the MiG Alley engine, so graphically speaking, Battle of Britain looks a lot like it, which can be a bit of a disappointment at times, but it also looks better in many respects too. The ground texture detail is much more illustrated, and a lot more attention has been paid to the textures overall. There's a more realistic look to the terrain than what MiG Alley had to offer. All the R.A.F. airbases in the Southeast of England are present and modeled as accurately as possible. Even little sheep can be found on the ground in Battle of Britain. London has also been given special attention, as many recognizable landmarks have been rendered there, like Big Ben, the London Bridge, etc. Actually flying over London is a treat in Battle of Britain from either side.

Mobile units are present on the ground in many places, usually around airbases or wherever the action is taking place. Shipping convoys with destroyer escorts can be found and bombed into oblivion over the seas. You'll definitely find enough stuff to destroy in England as the Luftwaffe in Battle of Britain.

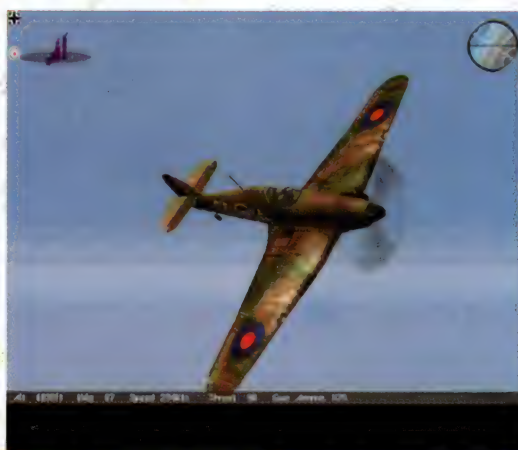
The cockpit art inside the planes is also more refined than what was found in MiG Alley. All of the planes feature a lot more moving parts and feature more detail from the external views than the planes offered in MiG Alley too. 3D clouds are now present, in addition to the layered cloud effects previously found in MiG Alley. The 3D clouds look outstanding, and different formations of them are rendered, making for some very realistic looking skies.

Although resolutions for 640x480 16-bit all the way up to 1600x1200 in 32-bit color are offered, you'll need a fast 3-D accelerator and CPU to run it in the higher modes. On a PIII 550MHz it runs nice at 800x600, and on my 1GHz machine with a GeForce 2 Ultra it's very nice in modes as high as 1280x1024. RAM also plays a role in performance, so you had better have at least 128MB if you want to avoid any stuttering.

Visual Effects and Realism

Damage is also visually represented very well in Battle of Britain. Parts of your plane and enemy planes can be torn apart by gunfire and the meshing and structure that lies beneath is revealed gradually, making for a much more realistic looking effect of damage being taken on by the airframes. At first you may find a little paint missing, next a panel and before you know if you plane has been broken apart diving head on into the ground in a fiery blaze of glory.

Early Radar technology is also modeled in Battle of Britain for the Brits, which is historically accurate, and it was used effectively by the British RAF. It helped to warn them of some of the incoming attacks (when it wasn't malfunctioning). In the game,



The Hurricane flying high in the sky (top); The Lutwaffe Commander campaign interface menu (center); A Spitfire shot down in flames by the tail gunner (below).



the loss of early warning Radar can affect the chances of a squadron being ready, and making it into the air to thwart the oncoming attack. Therefore, the Radar systems modeled do have a big impact on how Battle of Britain is played out.

Knocking out Radar may also be a task for players, as a direct approach won't always work due to the way the sites are constructed. Taking out a controller building, power lines or generators may be the best and only means of disabling the RAF's Radar in Battle of Britain. All kinds of other factors can affect the outcome of other things, as a downed Radar sight will result in raids slipping through the net. The loss of an essential factory cuts the flow of replacement aircraft. A squadron continually on alert, always sent into combat will suffer from fatigue and will have to be rested, and so on.

Campaigns

First, Battle of Britain is a combat flight simulation, but in terms of gameplay, Battle of Britain is unique.

The Campaigns are played out as Supreme Commander, almost like a strategic tactical war game of the Battle of Britain, but at any time you can jump in and take command of the flyable planes as they're made available. This mode of play reminds me a great deal of DID's Total Air War, but Battle of Britain is a lot more in-depth. The planning board is actually a replica of the plotting board that the RAF Fighter Command really used, and is packed full of data that looks very authentic. It looks a lot like something you'd expect to find in a bunker somewhere at the RAF high command. It's your job as the Commander for either side to decide when squadrons

are to rest and when they're to fight. You can manage their movements right down to the waypoint.

Although Battle of Britain uses a lot of the MiG Alley technology as a foundation, the campaign engine in Battle of Britain is new, and is of the real-time variety. Very much like what is offered in Falcon 4.0, because the missions are all flown with or without your participation (if you don't choose to jump in and fly), in real-time no less!

Battle of Britain is a little different than most flight combat simulations, as you can set preferences for your favorite type of aircraft, squadron or type of incident (take-off, reaching the coastline, bombing runs, etc). The simulator will automatically give you the option of flying in any engagement that occurs, matching those criteria in real-time, which is a very nice option.

You can also leave the 3D-sim at any time and go back to the Campaign map where the battle wages on. If you like you can even check on how things are going and jump back into the

3D-sim again somewhere else if you like. Best of all, if you die in the 3D-sim, the aircraft and pilot you had taken control of will be lost, but you can just go back to the map and carry on as Commander, or again as a fighter pilot or gunner of another bomber aircraft!

Depending on which side you play will determine what your objectives are. As RAF Commander, you manage the campaign from the plotting room map. Here you'll find markers for key targets, including the option to use historically accurate icons, raids that have been detected, and RAF squadrons in the air. As you watch the map in real-time (you can accelerate time to as fast as 20X) all of the marker positions are continually updated. Warning messages from your staff will keep you informed of all developments, such as an airfield being attacked or a raid crossing the coast.

As the commander, you must carefully manage your over-stretched forces. You must decide which squadrons to bring to standby, which to rest, when and if to scramble against raids and where to intercept them effectively. What's more, the player doesn't have to take care of every little detail and watch the map like a hawk, although some players will enjoy doing so. Thankfully, automated systems that take varying amounts of the workload off the player are in place. So that they can concentrate on the big picture, and overall it makes the simulation easier to manage for newbies.

As Luftwaffe Commander, everything is played almost the same, but you have the initiative. The day is split into 3 periods. At the start of each period, you decide which targets to attack and how many aircraft to send. Rowan has also simulated the Luftwaffe's 1,000 aircraft raids, so things can get perilous. On a couple of occasions when attacking London, the Germans launched every available aircraft they had in 1 raid - over 1,000 aircraft. The player can do the same in Battle of Britain.

Multiplayer

Several options are also included, and yes, cooperative multiplayer is an option for single player missions, but not in the campaign mode. Fair enough. Aside from cooperative you'll find the usual head-to-head options. TCP/IP and IPX are the protocols provided for multiplayer games of Battle of Britain.

The maximum number of players supported is eight. My results were mixed at best over the Internet, as 4 out of 5 times there was a great deal of warping (out of sync gameplay with other players, where planes would disappear and reappear somewhere else around you). Considering MiG Alley's multiplayer features were also adequate at best, I wasn't expecting a lot from Battle of Britain as a multiplayer platform, and quite honestly, most people will spend most of their time playing out the outstanding dynamic campaign missions anyhow. It's far more stable over a LAN but as an Internet game don't get your hopes up.

Conclusion

Considering there isn't much competition out there in the realm of new WWII combat flight simulations, it's definitely the best one of its kind on the shelves right now. Battle of Britain also has the potential to eventually hold the status of classic, and if you look under the hood and dive into the gameplay, you'll find that it's by far the absolute best Battle of Britain conflict simulation to date.

Graphically speaking it would have looked a lot better if they had used a new graphics engine that really took advantage of all of the whiz-bang buzz-word features found on all of the latest and greatest 3D-accelerator cards on the market today. On the other hand, it doesn't look bad by any definition of the word, and the trade off between more eye-candy and the ability to create the large-scale battles that historically took place over British soil was worth it. Believe me when I tell you, if you thought the air battles in European Air War were huge, just wait until you get your first glimpse of some of the more challenging missions in this simulation.

So don't hesitate to give Battle of Britain a shot. It's a lot of fun, has a lot to offer and I found more to like than to complain about.

Empire Interactive

16th Floor,

580 California Street,

San Francisco, CA 94104

Internet: www.empireinteractive.com/BOB/main.htm

Preview of IL-2 Sturmovik

By Rod White

Although we've been treated to plenty of European conflict WWII combat simulations, and not nearly enough Pacific Theater conflict sims, what has been completely neglected time and again is the Eastern Front. A lot went on during 1941-1945 between Germany and Soviet Union. Millions of lives were lost, and relentless battles on the land and in the air took place.

Many called it the "Patriotic War" and combat flight simulation developers have neglected it until now. So it's only appropriate that the man responsible for creating a simulation based on the Eastern Front just so happens to be Russian himself; Oleg Maddox.

Maddox Games have been hard at work on IL2 for a good long while now. From what I recall this project started out development under Maddox Games alone, with Oleg being the driving force behind the project. However, in recent years Oleg combined forces with another development house, and 1C:Maddox Games was formed. Later, Blue Byte Software picked up the project, and now with a decent development budget and a major publishing label behind it, IL2 may very well finally take flight to store shelves this year!

Very few simulations have been in development as long as the one. I can recall hearing about this simulation way back in 1997! This is unquestionably a unique title, as it was originally intended to be just a simulation of the IL2 Sturmovik. It has since evolved into something broader in scope, and IL2 now promises to offer the IL2 and an additional 17 Russian and German planes to shoot at or fly into battle.

Aircraft

The focus of the game is unquestionably the Ilyushin IL-2 Sturmovik. It's a very unique plane, as 36,000+ IL2 aircraft of various types were produced during WWII. Variants include the original single seat IL2, and later versions added a rear gunner with a larger caliber machine gun. Some other variants were strictly torpedo bombers and armored anti armor bomber fighters, while others were just updates of the original single seat design with a more powerful engine, wing modifications, and different caliber main guns or gun configurations. There are 7 different models of the IL2s in the simulation. Due to its design it was one of the best tank smashing planes around, making it an outstanding air-to-ground platform. This also makes IL2 an outstanding simulation, filled with both air-to-air and air-to-ground missions. So this won't be just another dog fighting simulation over Soviet and German airspace.

Other planes modeled include:

- ❖ Two versions of the LaGG
- ❖ MiG3
- ❖ MiG 3U (which features a new engine and 20mm cannons).



Tank busting Russian style! (top); Photo-realistic cockpit graphics (above); Outstanding winter terrain (below).





Very pretty guns a blazing (above); Swooping in on the German prey (below); Tank busting from within the cockpit (bottom).



- ❖ P-39N-1 (U.S built)
- ❖ P-39Q-1 (U.S built)
- ❖ P-39Q-10 (U.S built)
- ❖ Bf 109F-2 (German)
- ❖ Bf 109G-2 (German)
- ❖ Bf 109G6 (German)

In the way of non-flyable planes you'll encounter the He 111, Ju 87B, Ju87D, Ju87G, Ju 88, Fiesler Storch, Ju 52, I-16, La5FN, La 7, Yak 1, Yak 3, Yak 7 and Yak 9. So, there's definitely enough opposition to face in IL2.

In the flight realism department, Maddox and Blue Byte promise hardcore realism, while the means to switch off features like stalls, spins and blackouts will also be present. In this early version, the flight modeling seemed a little forgiving, but at the same time, it felt good. It feels like they're moving in the right direction with it, as there's a degree of fluidity in the current flight models. Moreover, they're not done yet, since this is in pre-beta stage of development.

Graphics

The ground is also well populated. There are almost too many ground vehicles to list! Locomotives, field guns, cars, half tracks, AA guns, fuel cars, radio cars, civilian cars, personnel carriers, BMW motorcycles, even lend lease Sherman tanks can be found in the scenarios offered. And that's just scratching the surface, because in the area of buildings and towns the developer claims that the average map in IL-2 contains over 300,000 buildings! Many of the scenarios I've seen makes me believe that he isn't lying either. Sure I haven't seen 300,000 buildings at once, but I've seen hundreds, which is an impressive sight. The tanks and various ground units have positional armor modeled; making for some very realistically reproduced tanks and other armored vehicles in the simulation. The armor is modeled as it should be for each of the vehicles. Therefore, tactics that work on one specific tank or armored vehicle may not work play out the same way on others.

Visually speaking the game will run via Direct 3D (DX8) and Open GL. I've been running the sim at 1024x768 via Open GL on a GeForce 2 Ultra, and it looks outstanding! The fire blazing from the plane guns and cannons and the rockets flying and smoke trails are stupendous in IL2. The explosions are also very appealing to the eye, as are all of the ground unit models as they turn to debris before your eyes as you destroy them. All of the tanks and vehicles on the ground look very lifelike, so it appears that they have done their homework in the area of realism. Each of the planes in IL2 is an eyeful too. Every individual one is painstakingly detailed, and the damage modeling is splendid. The visual damage effects of holes through the fuselage, tail, wings and other components are great, and there is a lifelike look to the destruction.

The terrain and environmental effects of rain, snow and other effects also look great in IL2. The rest of the terrain is as equally impressive, and everything on the ground looks realistic. Not so much like a land of cardboard cutouts as some other simulations can appear.

One other visual effect worth mentioning is the blacking out effect. It's unique in IL2 and hard to explain. Instead of the entire screen blacking out (as blacking out works in most sims), it's as if the screen slowly gets darker in IL2 and harder to see in a psychedelic sort of way. It's very weird and very cool at the same time. I think anyone who sees it will appreciate it. The effect allows you to sort of see what's going on, but then again, not.

Missions and Campaigns

There are single missions and six campaigns encompassing early battles on the Eastern Front in 1941, all the way to the last days in 1945. To keep things historically correct players will also find that as they fly later missions the load-outs and weapons will be upgraded, just as they were in that period of the war. You can also fly many of the missions as a rear gunner, and let the AI pilot handle the flying. Or you can switch between the two in-flight. In addition to the campaigns and single missions there's also a Full Mission Builder and Quick Mission Builder. Both will allow you to make your own missions, but the Full Mission Builder is a far more powerful tool, allowing you to do a lot more than the Quick Mission Builder. So the replay factor is going to be high when the enthusiast community starts creating missions for it once it is released.

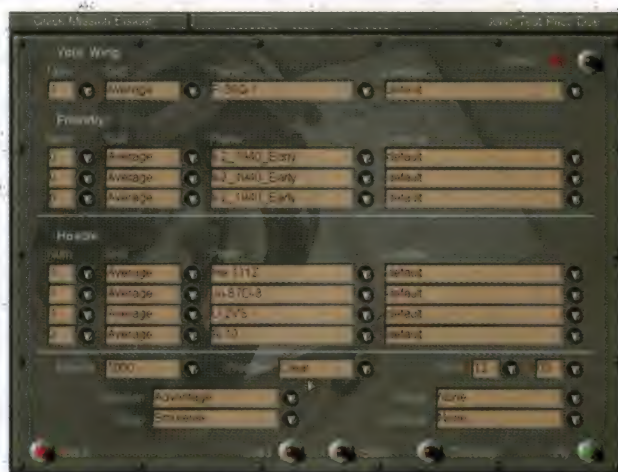
Multiplayer

IL2 will support up to 32 players over a LAN or via the Internet. The way it will work is that they will support up to 32 players for head-to-head dog fighting, and up to 16 players at once for cooperative missions. Unfortunately, cooperative won't include the means to play the campaign or single missions that way. But pilots will be able to fly missions created with the mission building tools. Enthusiasts can also customize their planes by changing the squadron markings and camouflage schemes.

Release date

IL2 is set for release the second quarter of 2001, so that means anytime between when you read this until the beginning of summer. They don't plan to offer IL2 at retail, so it's not a title you'll be able to stroll into Electronics Boutique or Comp USA and pick up. Blue Byte is trying a different approach instead: you will be able to buy it here in the US via their Blue Byte Direct website at bluebyte.com. I think they're using this approach because quite honestly, IL2 has the potential to become a hit among the combat flight simulation enthusiast crowd, but the casual gaming enthusiast might pass.

There isn't that many combat flight simulations in development that will hit stores shelves this year compared to previous years. So the lack of competition is a great thing for them, but it's the subject matter that's at question, because really not too many casual gaming enthusiasts have even heard of an IL2, or any other Russian plane that doesn't start with MiG. And the reality is that to sell enough copies to cover costs, every publisher/developer relies on the sales from casual gamers as well. In the end, the compulsive casual gaming enthusiast far outweighs the number of hardcore combat flight simulation enthusiasts in numbers.



Taking flight at dawn (top); Quick Mission Builder screen (below); A gorgeous IL2 in winter colors (bottom)



Being unique as IL2 is can help it or hurt it, so I think it's wise that Blue Byte plans to distribute it as they are. Personally, I think IL2 will be one of the best simulations we see released this year. Only time will tell how well it goes

over. One thing is certain: the combat flight simulation enthusiasts will accept it with open arms. We have already waited years for this one.

FlightSim Commander

By Phil Paschutine

FlightSim Commander is a flight planner, airport viewer, GPS, ATC, and navigation program for Microsoft Flight Simulator 2000. Published by Aerosoft, it was originally developed as a shareware program by Sascha Felix, another well know FS add-on program contributor.

FlightSim Commander comes with 50 individual databases that are packed with nav aids and airports. These databases make up the 13 major scenery areas covering the FS 2000 world. Databases can be added to or deleted from any area. When installing new FS scenery, you can create additional databases from .bgl/AFD scenery data files. Control zones, taxiway information and reporting points (if you own Microsoft Access) can be added.

Each time you load FlightSim Commander you are prompted to load one or more geographic area(s) or a user-defined database. Once this is done you can go to the Map View or to the Flight Planner.

Map View

You simply use the country/state, ICAO prefix, or airport name to chose ain airport. The map centers on any selected point. Map features can be displayed/hidden and overlays

added to delineate coastlines or geopolitical boundaries. To save on loading time, Intersections are loaded separately. Map view includes an airport preview window displaying basic airport outline with associated runway and navaid information, which can be printed. The map zoom range is 1-4000

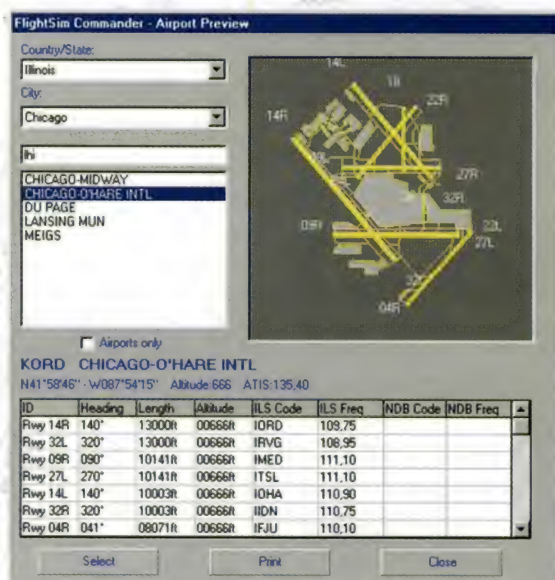
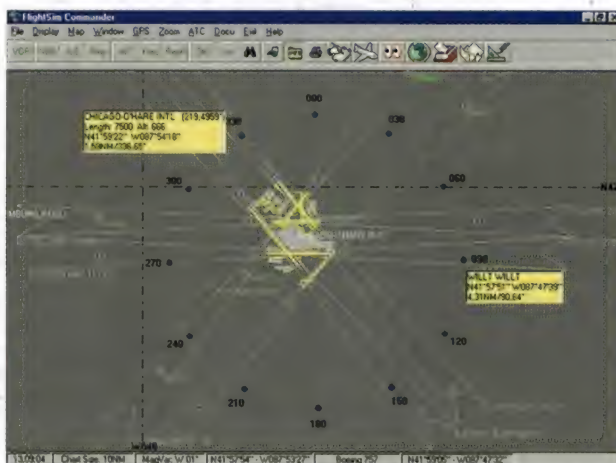
nm, using the Page Up/Page Down keys, and 10-800 nm using the menu presets. The status bar displays time, zoom value, center point coordinates, MagVar, aircraft and mouse cursor coordinates. A VOR rose is displayed in the center of the screen.

You can obtain information on any navaid/airport by clicking on it, and a yellow information box appears. These information boxes can be moved anywhere on the map so



Map View - airport preview (right)

Map View - map 10 nm zoom (far right)



that your view is not cluttered. If you click on the navaid/airport again the information box will return to its original position.

Aircraft parameters are used in flight planning, so make sure that you load the correct one! The aircraft database can be edited, so that new aircraft are included.

The Procedure Building

With Flight Sim Commander you can create your own simple procedures and save them for later use. Just add it to the flight plan or place it in the map. You can also select a VOR reference point, speed, time, distance and heading. If required, you can select a radial and distance from a VOR, then click on Draw to visualize the procedure. The procedure builder will allow only one procedure per flight plan, and any new procedure you select or create will replace the previous one.

Creating Flight Plans

This involves selecting a departure and destination airport, selecting an approach, and letting the program build the flight plan automatically. You can also create your own manually. Flight plans can be saved in FS2K format if you wish.

If your departure or destination have SID/STAR procedures, these can be viewed and printed. There is a wealth of other features like airport layouts, fuel, and profile view information windows.

Flight planning offers other features such as great circle navigation, departure/destination information, alternate airports, and airport maps. You can also make fuel calculations, with a choice of measurement systems (gal, liters, lbs., kg).

Weather Generation

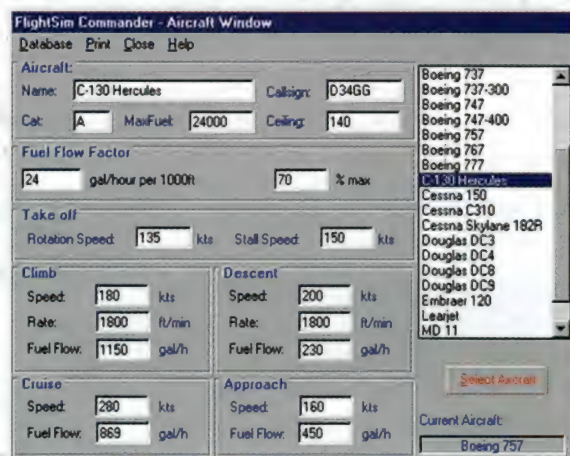
Weather can be built and added to the flight plan. You can choose from two to six weather zones for clouds and wind, generate random weather, or create your own and attach it to the flight plan. Different weather files can be created and recalled later. Each relative weather zone width, as well as relative extension of adjacent winds and clouds layers can be resized. However, I did have some problems trying to get this to load into FS 2000.

GPS Capability

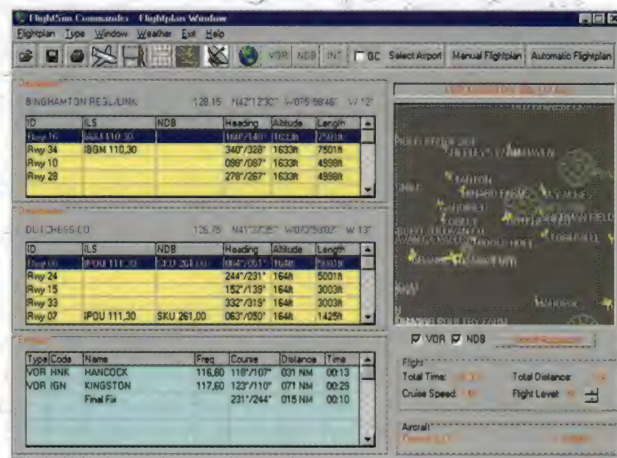
If you intend using the program as a GPS and the moving map, you can send the flight plan to map view. If you select a runway, map view will automatically update to show the procedure associated with that runway.

The GPS is simple to use. It loads the current saved flight plan and displays flight data on four pages in FS 2000. The first page displays aircraft position, altitude (AGL), TAS, Ground Speed, flight track, magnetic heading, wind correction angle, and MagVar.

The second page displays the name, frequency of the next waypoint, current altitude, altitude (AGL), magnetic heading, bearing, wind correction angle, and distance to the next waypoint. The third page will display destination airport data such as runway in use, runway elevation and length, nav aids, ATIS, distance remaining, ETA. The fourth page displays wind speed and direction at ground altitude, and at current altitude. This page did not display

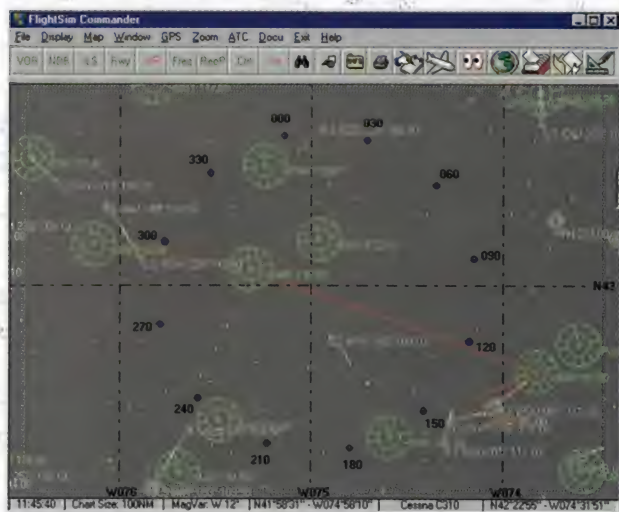


New aircraft can be added to the existing database. (top); The Automatic Flight Plan Window (above); The Manual Flight Plan Window (below).





SID/STAR information window (above); A wealth of features like airport layout, fuel and profile view windows are available. (below); A flight plan placed in map view to use the program as a GPS and Moving Map. (bottom)



any weather information from FS created weather or weather attached to flight plan. I'm not sure that if this was due to errors I made or a bug. You can call a map/arc window with information on features (navaids, airports, centers, etc) that can be toggled on/off. The map can be centered and zoomed in/out. The GPS has a final approach window enabling you to see your vertical and horizontal trajectory 15 nm to your destination airport.

After shutting down the GPS, the final app window remained active: a bug no doubt

Voice ATC

ATC voice/ text is added if you have created a flight plan, selected "ATC" in Map view, and activated the GPS. But I did not care for the fact that, although I have a full duplex sound card, I had to disable engine sound "Q" to hear ATC. ATC kept asking me to contact tower on a given frequency, which I did repeatedly, but got nowhere. The program does provide random chatter, which worked fine. If you have Microsoft Access, you can customize ATC chatter and regular ATC messages.

I was not at all satisfied with the ATC feature. Apart from random chatter, it did not perform as indicated.

Flight Tracking

This allows you to record and replay a flight in the program's map view, with attitude, altitude and speed data provided in a profile view. However, I could not get the delete feature to work, and found the instruments hard to read during replay.

Documentation

The 122-page German/English manual is a necessary read! The CD includes FS2000 standard and pro 2b updates for the German FS version, and additional demos, such as PPL trainer (in German), Jeppesen charts and Airlines flights.

Conclusion

FlightSim Commander, formerly known as FlightSim Planner 98, has been around for some time. Although new features were added, some features like the user interface and the ATC function need to be improved. I don't think that FlightSim Commander is a bad program, but the new generation flight planners now outrank it. So if you are a seasoned flight simmer with very good knowledge of flight planner/moving maps you may want to look elsewhere. But if you are a new hand at flight planning, then FlightSim Commander is a simple flight planner/moving map that will suit your needs.

Author: Sascha Felix

Publisher: Aerosoft GmbH Lindberghring 12
D - 33142 Büren-Ahden Germany

SRP: \$34.99

Web site: <http://www.aerosoft.com/>

767 Pilot in Command

By Tim Dickens



The title of this unique add-on package pretty much sums up the entire concept behind the project. Rather than another “heavy iron” aircraft and panel for the simulator, this package almost becomes another simulator in itself.

Without question, the driving force behind this project is Eric Ernst, whose 767 panel for FS 98 made quite a splash a few years ago. It was without question the best 767 panel at that time, and now it looks like he will take the blue ribbon for FS 2000 as well. This panel clearly beats the competition easily, and some of the competition out there is already pretty darn good.

Eric is a commercial pilot by trade. He had quite a bit of stick time with the ATR 72, flying for American Eagle. Then he was promoted to the heavy iron, the Boeing 767. His every day working knowledge of the aircraft and its systems is behind the accuracy of the system modeling in this package. And as I said, that is what this package is all about.

Before getting into some of the details of this package, I think it would be best to point one thing out. This isn't a jump-in-and-fly-it package. So if you are one of those simmers who likes to start the simulator, with the plane running, ready to take off, so you can just push the throttle forward and start flying, this one is not for you. But if you are one of the (affectionately known as) button pushers, who want as many real-world systems simulated as possible, you *will* fall in love with it. It just depends on where you are coming from.

Installation and Documentation

The automated installation program puts everything where it belongs on your hard drive. There is a choice of 14 different paint schemes for the aircraft, which of course means that there would be 14 new aircraft folders installed on your system if you so choose. You can uncheck the liveries you do not want, with the exception of four that are installed by default because they are needed for the pre-recorded flights and the system failure adventures.

The printed manual is quite thin, and quite honestly, a lot less than I expected for the package. On the other hand, the .pdf manuals in the Documentation folder on the CD-ROM are quite large, totaling 224 pages, which is a lot more than I expected. Here again, it really depends on where you are coming from as a simmer, as a lot of this material really is required reading to operate the panel and systems properly. So if you are a “button pusher,” you're gonna love it. The manuals contain everything you would ever need or want to know about the 767. But if you don't want to work that hard, forget it. This package is not for you. Note that you need to have version 4.0 of Acrobat Reader installed to open this manual. If you don't have it, Adobe Acrobat Reader 4.0 can be found in the “Extras” folder of the CD-ROM.



The full-feature FMC works just like its real world counterpart (top); The program installs a scrolling adventure text window, which unfortunately becomes a permanent part of all your panels. (above); A new menu section is installed into FS 2000, where you can access the system failures. (below)



Working the panel

So that you don't need a full in-service at Boeing's Aviation School to fly this thing, the first time you load the panel a "Quick Tips" menu pops up. But you have the option of shutting it off by default once you get the hang of this thing. It does go through the important things you need to know to at least get this thing off the ground. But be forewarned that you will eventually need to browse the manuals on the CD-ROM. Particularly when it comes time to operate the FMC and autopilot. I won't go into detail on all of the systems, which are modeled exactly after the real world Boeing 767.

A good example of this is the Inertial Reference System (IRC), and how it interfaces with the FMC. In the real world aircraft, the IRC requires a ten-minute cycle before it can load data into the FMC. To make it a little easier for the poor ol' simmer they shortened this time to two minutes. But the point is that you had better know that before trying to fly this thing.

Admiring the panel

You just *have* to admire this panel. Being a panel designer myself, I fully appreciate what goes into creating a quality product. Eric Ernst created the panel bitmap and interior artwork itself from high-resolution photographs. Eric has a leg up on everyone in this department, since he certainly has no problem getting access to a 767 cockpit. The systems are modeled according to his extensive experience in the 767 cockpit.

But of course, credit should be given to all of the team members that produced this wonderful panel. Laurent Crenier did the overhead panel, programming for many of the gauges, the systems modeling, and the adventure interface. Pedro Sousa programmed the FMC gauge and database, and Wade Chafe did quite a bit of the gauge programming as well, including the vector-drawn displays.

Visually this is certainly the best panel I have seen for any kind of heavy jet in FS 2000. The overhead and pedestal look so real you feel like you can reach out and touch the controls. The overhead and pedestal can be accessed though the menu in the usual fashion, or through "hot button" switches toward the bottom of the panel. The panel is somewhat large in size, which really is hard to avoid when creating this type of instrumentation. What I found quite undesirable though was the fact that it will not allow for resizing on Windows 2000 operating systems (unless you like simulator crashes). This really should not be, and I hope they address this in a future update.

Functionally it is as equivalent to the real thing as you can get within the FS 2000 environment. The gauge programmers certainly put a great deal of work into modeling the real world aircraft systems. Absolute candy for any



Access to the overhead panel and pedestal can be attained through panel switches. (above left); Night lighting effects of the Boeing 767 panel. (above right); The paint schemes of the aircraft visual model need quite a bit of improvement. (below)



"button pusher." The only criticism I can offer in this regard is that the FMC does not have a very complete SID/STAR database. In fact, it is quite *incomplete*.

The truly unique function, created by Laurent Crenier, is the failure system adventure enhancements. Highly advanced and realistic failures can be user programmed through the menu interface that Pilot in Command installs into FS 2000. A variety of hydraulic, mechanical and electrical failures can be selected by the user and at different complexity/skill levels. Top notch programming.

Performance wise, this panel is a frame rate hog. The advanced systems and programming not withstanding, it really *should* perform better than it does. All of this gauge programming is certainly going to take up some resources, but I believe the hit is really too much. On my 800 MHz system, with a GeForce 2 GTS 64 MB video card, there was a drastic drop in frame rates compared to the default (and of course, much simpler) 737 panel. Not a problem with the performance overhead on the system I tested it on, and simulator fluidity was not compromised in any way. But when I tested it on a second system (500 MHz, TNT video card) it did not do so well. Wilco's system requirements mention that this will run on a 300 MHz machine. I don't think this is a very realistic expectation. So, unless you have some system muscle, I think this is something you will need to take into account.

All things being considered, I do not want to make too much out of the frame rate issue. This panel is simply wonderful, and reflects a great deal of honest, top quality work on the part of the team members. It just doesn't get better than this, folks.

Some further observations

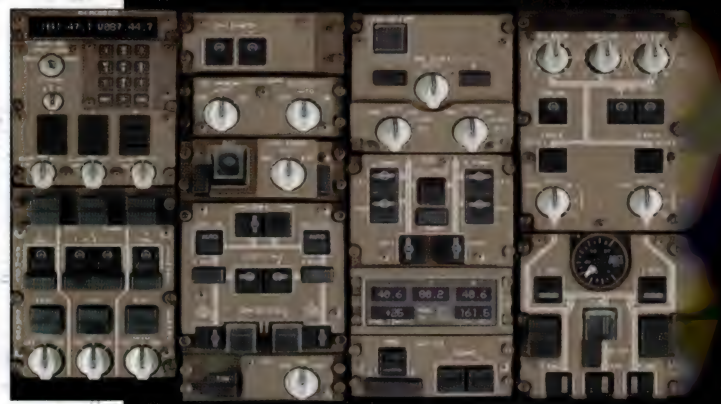
You can't really review an aircraft and panel package without talking about the aircraft. The flight model is quite good, and the aircraft performs well under both stick flying, and through the autopilot system. In terms of moment of inertia, speed accuracy, and thrust I believe the flight model very good. It also bleeds energy for landing without having to induce tremendous amounts of drag through the flaps or spoilers, which is something that many FS heavy jet models do not do well.

Now that I've given you the molasses, I'm going to have to feed you the sulfur. And frankly, I was not at all impressed with the aircraft visual modeling. Although many individual parts of the aircraft look like some very detailed work had been done, other aspects are just not up to snuff. Many fuselage parts, like the tail section, do not look nearly as good as the current freeware standard. The windows are clearly out of scale and have an unfinished look, as do the entire paint schemes. There is a *lot* of room for improvement here.

But I also have to say that the following things about the package do bother me:

1. The aircraft visual models are constructed using scenery .bgl files, and not through the aircraft section/ .mdl model file structure. This is a very big programming no-no, and leads to poor frame rate performance. Very likely a big part of the frame rate hit I attributed to the panel previously. It is very much "unholy" coding, and leads to other

PICoverhead The overhead panel with working switches to a multitude of aircraft systems no usually found in an FS aircraft
PICpanel The outstanding instrument panel for the Boeing 767
PICpedestal The controls on the pedestal look so real you think you can reach out and touch them



system-wide problems in the simulator. Microsoft Flight Simulator was simply not designed to work this way.

2. On my system, which uses the Windows 2000 operating system, the simulator locks up on exit when you leave the simulator with this plane loaded. It also produces a memory fault in FS2000.exe when attempting to use full screen mode. The FAQ on Wilco's web site states:

"Although Windows 2000 is not recommended as a gaming platform, the panel can work with a few limitations and adjustments. If you try to resize the panel windows or switch between windowed/full screen modes the sim may crash"

With all due respect, this is simply not true. In fact, the Microsoft design team used Windows 2000 when developing FS 2000. The only problems encountered using Windows 2000 and FS 2000 aircraft are related to improper 3rd party code, which can all be corrected. None, except for this aircraft, cause program crashes. In fact, Windows 2000 works quite well as a "gaming platform" in general, with the exception of programs that are not written correctly in 32-bit code, or older programs. These software faults should be corrected.

3. The program automatically installs the .dll program AdvDisplay, from Pete Dowson. This is a program that ports scrolling adventure text into a separate window in all of your FS 2000 panels. It may certainly be an excellent utility for someone who wants it. But I don't, and I was more than a little displeased to suddenly find this panel window intruding on the rest of my instrument panels. It is quite presumptive for a publisher to think that all users want a utility required for their program system-wide without consent. It shows a certain amount of hubris, and is at best inconsiderate.

The aircraft visual modeling is really not up to current standards, as the sharp angles of the tail section demonstrate. (left) The cockpit interiors are based on excellent real world photography, and are very convincing. (right)



4. There are a number of problems related to the autopilot that the FAQs on the Wilco site attribute to "joystick noise" or calibration. I fully understand the desire to reproduce real-world systems and events, but let's get real here. We are operating within the PC environment, and the software should co-exist with normal PC hardware setups. This software does not, and the problems should be corrected.

Conclusion

Even considering my objections, this is truly an outstanding instrument panel. It is definitely geared toward simmers that hunger for the ultimate in system realism in their flight simulation experience. Realism that is not offered elsewhere in the FS 2000 community. Based on this, FS newcomers, or those who have a more "easygoing" interest in virtual flying may find this panel system too overwhelming. You're going to have to do some work to learn the systems and operate this panel.

I give this package a solid A++ rating for the panel, an A for the aircraft flight model, and a reluctant but honest D for the aircraft visual model and construction. Partly due to some mediocre painting and general visual design, but mostly for the inappropriate use of the scenery engine to render the aircraft model. As for the bugs, and the objections I outlined, I don't think you should consider them to be show stoppers. They can most likely be corrected.

Wilco Publishing
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Drogenbos Belgium
Internet: www.wilcopub.com



Pacific Crossing

Continued from page 26

As a rule, you don't dare to go to sleep right away. You have 22 hours of free time before the next flight. If you sleep for 8 to 10 hours on arrival, you'll have been up 12 hours already before starting the next flight. You have to fight it. So Perry and I cleaned up and hit the town. A couple of beers, a meal and some shopping killed off about 6 hours. Then we made our way back to the hotel and hit the sack. I just died for 8 hours.

We got up, showered and hit the main shopping areas of Seoul. It was a real culture shock for me. Bought some souvenirs, had some lunch and made it back to the Hotel four hours later for another sleep before checking out and heading back. It is definitely not like in the movies. There were no parties and drinking and all this stuff we hear about regarding commercial airline crews while on crew rest. The only thing in the mind of all the crewmembers with whom I talked was getting enough rest before they have to fly back. I met a crew from United Airlines, and they were telling me the same thing as our Air Canada crew. Sleep, a little shopping, and more sleep was the order of the day!

The trip back

At 15:30 local time, the entire crew met in the lobby of the Seoul Hilton. The conversation was on what everyone had bought or seen on the main drag. Mainly silk scarves, jeans and souvenirs. We boarded the bus and headed back to Kimpo airport. Cleared Korean customs and went to flight planning and weather briefing.

We boarded the plane for pre-flights, while it was still being loaded and cleaned up. The aircraft had just arrived from Vancouver, being this is a daily flight. (I felt comfort in remembering that these engines can go on forever). We took off from Kimpo and flew over the city. It was now evening and darkness had descended. I had a fantastic view of this city, of 15 million people, all lit up at night. It was quite the site. Unfortunately my digital camera is very sensitive to



Here I am at the controls. I tried to talk them into letting me fly this leg, but I'm afraid it was no sale!

motion and we were bouncing around a bit too much to be able to take an adequate picture.

Our flight back was on a more southern route, 45 degrees to 50 degrees north compared to 55 to 58 north. We rode the jetstream back with winds of 178 miles per hour on our tail. This at times gave us a ground speed of over 600 nm. The flight back took only 10.1 hours. We were under Tokyo control until 155 east longitude, then we swapped over to Oakland Oceanic. All the reporting in the middle of the Pacific is still done on HF radio. This was a going home affair for me, being an ex radio operator on Maritime Patrol airplanes.

I put in a total of 22.5 hours, mostly in the cockpit, on the 767-300ER. I certainly acquired a taste for flying this airplane on my computer. I am convinced that today's airline pilots are now accepting the fact that PC flight simulation technology is here to stay, and is advanced to the point of providing a good procedure trainer platform for any airplane.

Web Watch

Welcome to another flight aboard *Flight Simulator World WebWatch*. Today our journey will take us to a variety of sites.

Adam Howe

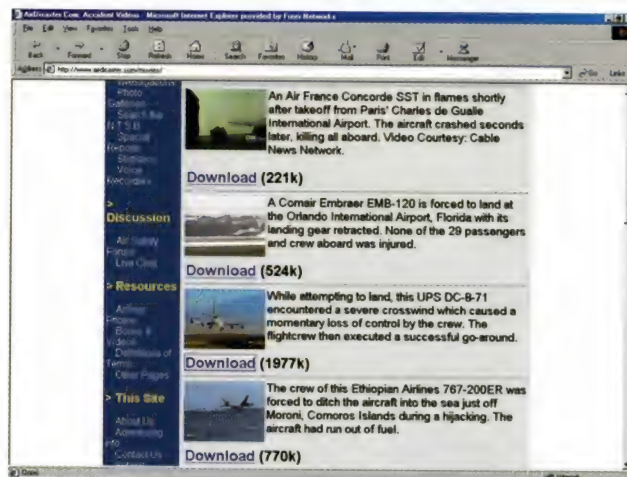
Air Disasters

To begin our flight we ask that you return your keyboard to its original upright position and secure your mouse as we set our browser to www.airdisaster.com.



I am sure a lot of you have been accused of staring at an accident along side the road – and yes, even I have fallen victim to the seemingly human instinct to look at an accident scene and figure out exactly what happened. AirDisaster.com is a good place for all us “onlookers.” Here you will find the latest news on every accident big

and small related to aviation. At AirDisaster.com, you will find an Accident Database, Eyewitness Reports, Full Text Reports, Investigations, Special Reports, Feature Articles, ‘Black-box’ recordings and videos of airplane crashes. If you are looking for the video of the Concorde going down, it can be found here. I’m glad they don’t have video of some of my (so-called) landings in Flight Sim!

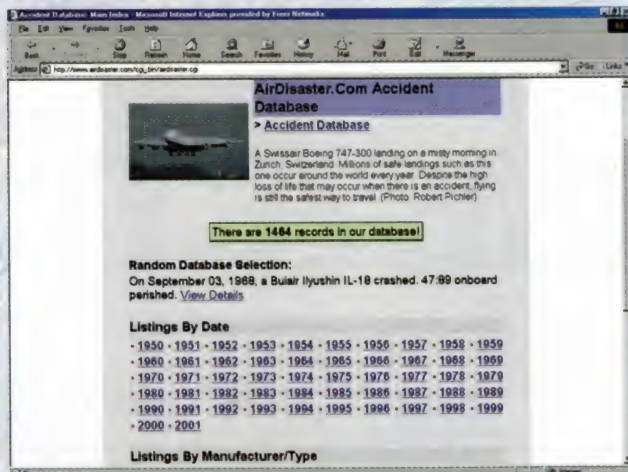


The Accident Database is broken down by year and by Aircraft manufacturer. If there is a specific accident you are looking for more information on, you need only know

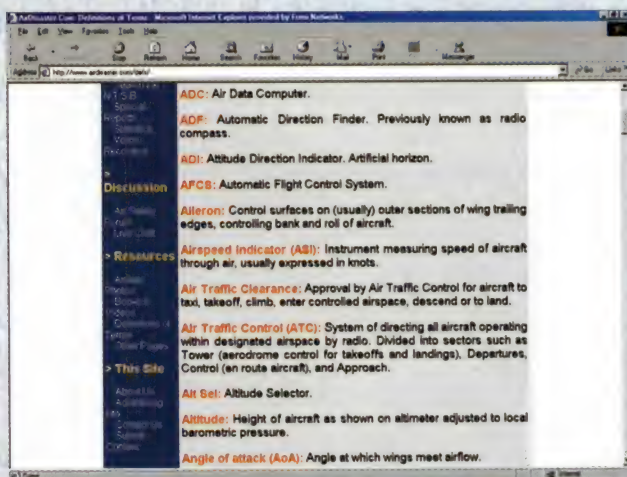
Internet Sites for Simmers

Web Watch

the year it happened or who made the aircraft involved. The accident reports (those available) are links to other sites (mainly government sites) and are listed in order by date.

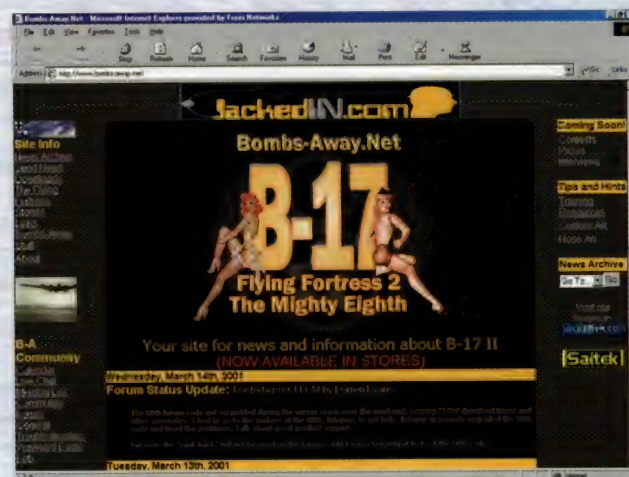


All the information on this site, whether you are a casual onlooker to the accident videos or you are researching accidents, this is a great place to begin your search. Other areas of Airdisater.com include a discussion and live chat area, airliner photos, books and videos and a page of definitions for aviation terms.



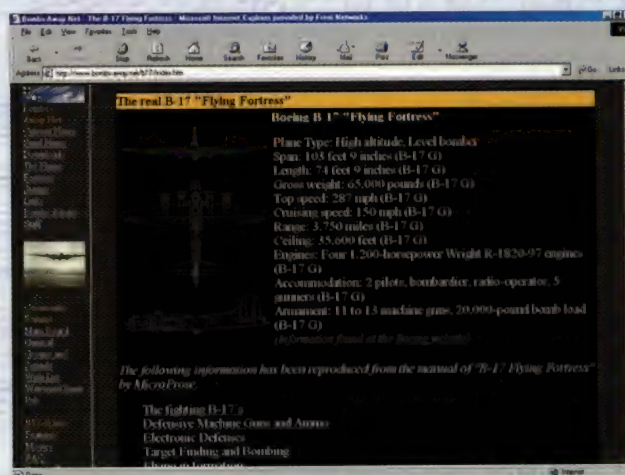
B-17 Bombers

Our next stop, by special request, takes us back in time a bit to the heyday of B-17 Bombers. Set your browser to www.bombs-away.net.

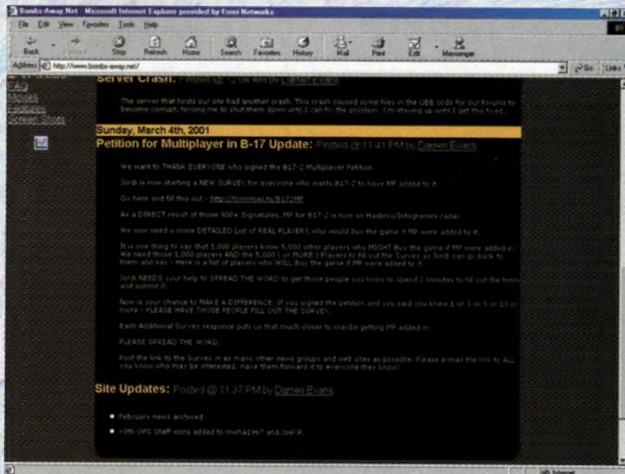


If you are a fan of Flying Fortress or own the game B-17 Flying Fortress II - The Mighty Eighth by Microprose, check out Bombs-Away.net for all the latest info on this game. This site is not a commercial site, but is maintained by fans of the game. The site boasts a News Archive, a Download Section, Stories, a Community Forum with a Main Board, Groups and Squadrons, a Wish List and more. There is also a lot of information available on the game itself including Features, Movies, FAQs and Screen Shots.

For complete information on the B-17 itself, there is a link that will give you a 3-view drawing of the planes (handy for those FS Design Studio users) and a complete breakdown of the Flying Fortress with info ranging from the engine types and horsepower to armament. There is also extensive information on the Machine Guns and ammo, Electronic Defenses, Target Finding and Bombing, Flying in Formation and Bombs.



I found this site to contain a lot of information about the Flying Fortress itself as well as the game. It seems like a great community in the making but it needs bit of work. Some of the pages were not yet active or were unavailable when I visited the site. It is a good place to visit to keep you informed. It also seems as though that B-17 Flying Fortress II was released without multi-player capabilities and Bombs-Away.net is gathering a list of users that would like to see it added.

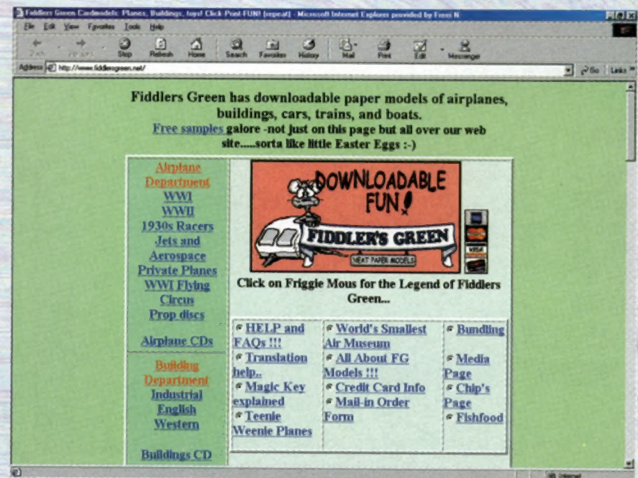


Paper Models and More

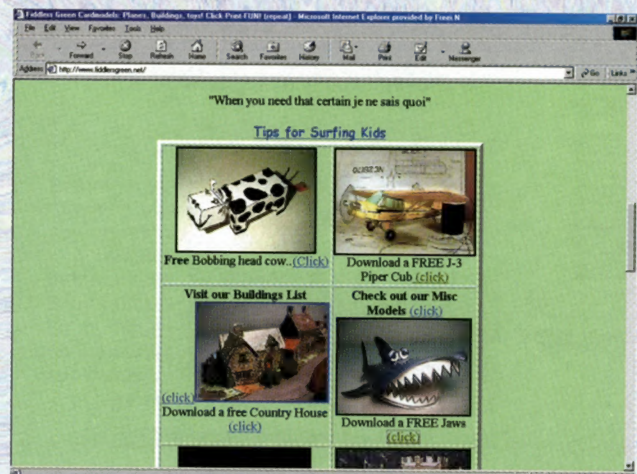
Now for those of you who have children or grandchildren, this next site is a great place to stop and pick up some stuff with which they can play.

At www.fiddlersgreen.net, you'll find a great collection of downloadable paper models of airplanes, buildings, cars, trains, and boats. Some of the items on the site are free – yes in this day and age, you can still get things for free!

On the main page, you will find a J3 Piper-Cub, a bobbing-head cow, a country house, a shark and more. Some of the other models cost a modest amount of money.



The free downloads are in PDF format which means you have to Have Adobe Acrobat Reader installed to view the files. Then you simply print them, cut out the shapes and assemble as described. The planes that are available for purchase are broken down into WWI, WWII, 1930s Racers, Jets and Aerospace, Private Planes, WWI Flying Circus and Prop Discs. The Building are sorted by Industrial, English and Western.



Stop by this site, if not for yourself, then for the little ones and make their day!

Tim Dickens Scenery

Our last stop on today's WebWatch brings us to the website of the well known Tim Dickens – yes the Managing Editor of *Flight Simulator World* magazine. It shard to believe he has the time to run a quality magazine and keep up a website – but he does!



Tim's FSHeartland includes download for scenery and panels for Microsoft's Flight Simulator. This site is also an extensive tutorial section with information on designing your own panels, installing aircraft and scenery, creating textures using Paint Shop Pro and an Airport and Scenery Designer tutorial that is still in development.



If you are a die-hard designer of scenery or panels, or if you are just getting into basic designing, this site contains a lot of information that you need to know. Be sure to check out the links page for top-notch, quality links to assist you with your panel and scenery design.

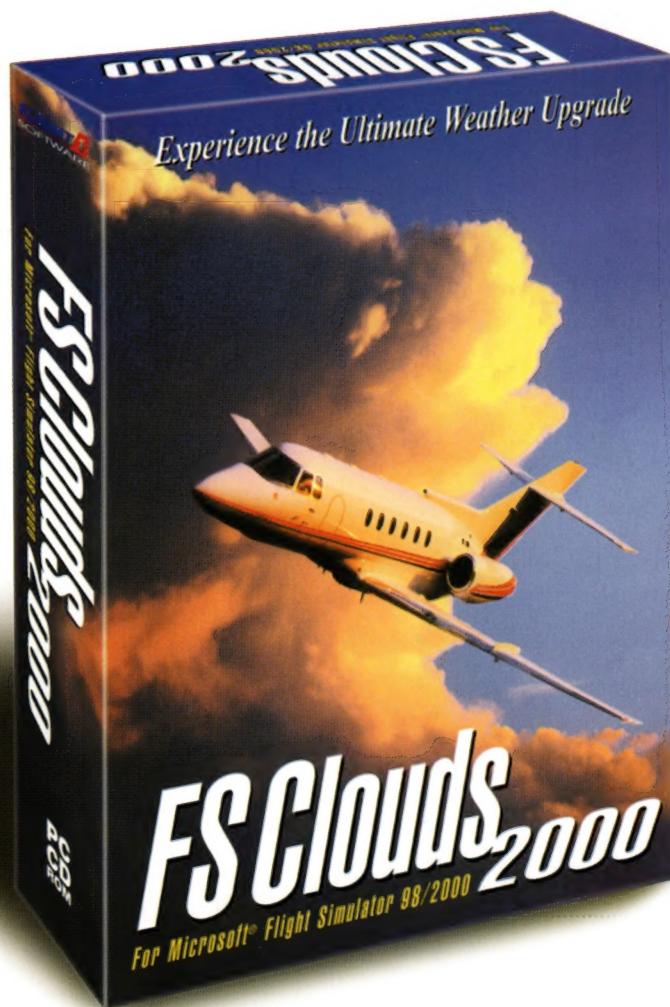


Thanks for joining us on our variety-filled adventure through the Internet. IF you have a website that is dedicated to Flight Simulation or aviation, or you know of a good site out there that has a lot of good information our readers would be interested in, please drop me a line and a link to: adam@flightsimulatorworld.com.

Origin of the name "Skunkworks"

The name Skunkworks comes from the Lockheed Martin project that built the U-2 (the aircraft that penetrated the Iron Curtain), the SR-71 Blackbird and the F-117A Stealth Fighter. Lockheed Martin got the name from Al Capp's "Li'l Abner" comic strip that featured an area called Skunk Works where Appalachian hillbillies ground up skunks, old shoes, and other foul-smelling ingredients to brew fearsome drinks and other products.

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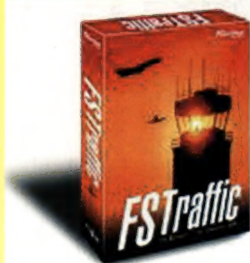
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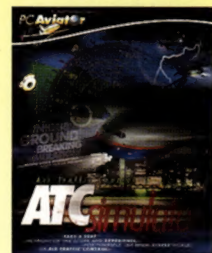


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